Residential wildfire mitigation and management preferences in Alberta

by

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Abstract

This thesis examines the adoption of wildfire mitigation measures by wildland-urban interface residential property owners, in Alberta, Canada. Knowledge of Canadian property owner adoption of wildfire mitigation measures is currently limited. This research aims to help decrease this knowledge gap by examining property owner risk perceptions, motivations, intentions and adoption among communities with lower and higher levels of community wildfire management. The findings indicate that respondents perceive there to be a moderate risk from wildfires. Respondents had moderate levels of adoption, completing on average over half of the total recommended activities. The most popular mitigation measures were those considered part of routine property maintenance. Intentions to adopt and actual adoption of wildfire mitigation measures are not influenced by community wildfire management levels. Community differences were observed in preferences for wildfire suppression and wildfire management practices. The implications of these results are discussed.

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1.0 Introduction

The main goal of this thesis is to examine property owner adoption of wildfire mitigation measures in six Alberta wildland-urban interface communities. A Wildland-Urban Interface (WUI) community is an area where structures, particularly houses and other human developments meet or are intermingled with forest and other vegetative fuel types (Chisholm Fire Review Committee, 2001). Mitigation refers to the long term sustained action to reduce or eliminate the impact or risk associated with wildfires (Canadian Wildland Fire Strategy Assistant Deputy Ministers Task Group, 2005). Property owner's decisions to adopt wildfire mitigation measures are negotiated through a complex decision-making process, which appear to be influenced, and moderated by risk perception, social and psychological factors (Martin et al., 2008; Paton, 2003; Paton, 2003). This thesis will explore the mitigation adoption decision-making process of residential property owners in the wildland-urban interface communities of Edson, Grande Cache, High Level, Hinton, Peace River and Whitecourt, Alberta.

1.1 Study Objectives

The primary objectives guiding this research are to:

1. Examine wildland-urban interface residential property owners' risk perceptions, motivation, intention to adopt, and adoption of wildfire mitigation activities among communities with lower and higher levels of community level wildfire management.

It is hypothesized that residential property owners in communities with higher

levels of community wildfire management will have greater intentions to adopt and greater adoption of wildfire mitigation measures.

2. Examine the influence of demographic factors, and social and psychological characteristics, on residential property owner's wildfire risk perception, motivation, intention to adopt, and adoption of wildfire mitigation measures.

It is hypothesized that certain demographic, social and psychological factors will significantly influence risk perceptions, motivations, intentions and adoptions.

3. Examine WUI residential property owners' wildfire management preferences.

Wildfire management preferences include preferences for fuel management techniques, such as prescribed burning, thinning and fireguards as well as risk reduction policies and measures, such as education programs and municipal bylaws.

1.2 Background

The pattern of wildfire occurrence in Canada shows that in the twenty-first century, severe wildfires occurred at increasing intervals and that the annual area burned has increased (Flannigan et al., 2005; Peter et al., 2006; Tymstra et al., 2007). This increase has been attributed to fuel accumulations resulting from historically successful wildfire suppression efforts and changing forest conditions (Peter et al., 2006; Peter et al., 2006). Climate change forecasts predict that in the future hotter, dryer seasons will result in an even greater increase in wildfire and severe wildfire occurrences as well as annual area burned (Flannigan et al., 2005; Peter et al., 2006; Running, 2006; Tymstra et al., 2007; Running, 2006). While predicting future wildfire occurrence is difficult and local wildfire occurrence may vary (some locations may actually experience no change or a decrease in

wildfire occurrence as impacts from climate change include increased summer precipitation), this potential future increase in wildfires necessitates attention, particularly because it has occurred alongside increasing human expansion into wildland areas (Peter et al., 2006).

Communities are expanding further into wildland areas as a result of people settling just beyond urban boundaries to live in a more rural setting (Buchan, 2006; Peter et al., 2006). As well, demand for recreational property and growth in isolated rural areas has resulted in increased development in wildland areas (Peter et al., 2006). This growth and expansion further into wildland areas results in an increase in the number of wildfires that will require suppression efforts in order to protect human life and development (Peter et al., 2006). Coupled with the pattern of wildfire occurrence previously mentioned, an increase in population in wildland-urban interface areas means that the risk from wildfires to humans has also increased.

The devastating effects of severe WUI wildfires have already been witnessed in Canada. In 2001, the Chisholm Fire destroyed houses and evacuated thousands of residents in and around Chilsolm, Alberta (Chisholm Fire Review Committee, 2001; Chisholm Fire Review Committee, 2001). In 2003, two separate wildfires devastated the communities of Louis Creek, McLure and Barriere and Kelowna (Anderson & Culbert, 2003). All four communities underwent evacuations and homes were lost in Kelowna and Louis Creek (Anderson & Culbert, 2003). Action is required to reduce the substantial economic and social losses that can occur when wildfires meet WUIs.

In recognition of these major wildfire events, as well as the trend in wildfire occurrences and human development in the WUI, the Canadian Council of Forest Ministers developed the new Canadian Wildland Fire Strategy (CWFS) (Canadian Wildland Fire Strategy Assistant Deputy Ministers Task Group, 2005).

The CWFS recognizes that wildfire suppression efforts must be accompanied by an emphasis on wildfire mitigation at both the provincial and municipal government levels as well as at the individual property owner level (Canadian Wildland Fire Strategy Assistant Deputy Ministers Task Group, 2005). Mitigation must occur at both municipal and provincial government and individual property owner levels for mitigation measures to be effective at reducing the potential risk from wildfires to WUI communities (Canadian Wildland Fire Strategy Assistant Deputy Ministers Task Group, 2005; McFarlane, 2006; Peter et al., 2006).

Currently, though, knowledge of Canadian residential property owner participation in mitigation activities is limited (McFarlane, 2006; McGee, 2005; McGee, 2005). The majority of research about property owner participation in mitigation has been conducted in the United States of America and Australia (Please refer to Chapter 2 for more information about this research). Findings from these other countries suggest that property owner engagement in wildfire mitigation show that property owner participation varies by geographic region and is influenced by various social, psychological and cultural factors (E.g. Bushnell et al., 2006; Brenkert-Smith et al., 2006; Fried et al., 1999; Gardner et al., 1987; Martin et al., 2008; McGee & Russell, 2003; Winter & Fried, 2000). Canadian research published to date has primarily been qualitative (McGee et al., 2005; McFarlane et al., 2007a; McFarlane et al., 2007b; McGee & McFarlane, n.d.; McGee & McFarlane, n.d.). The few quantitative studies examined property owner wildfire mitigation in only a larger urban center (McGee, 2005) or examined differences between experts and non-experts (Arvai et al., 2006; Zaksek & Arvai, 2004). Initial Canadian research findings consistently indicate that property owners tend to complete the same few wildfire mitigation activities but generally complete them for reasons other than to reduce the risk from potential wildfires. While these initial research findings have been consistent a need

remains to further examine WUI property owner adoption of wildfire mitigation measures and the factors that influence decisions to mitigate.

There is also a need to examine the relationship between community level wildfire management and the adoption of mitigation measures by residential property owners. Community psychology literature has found that action taken at a community level can have influential effects on action taken by individual members of a community (Dalton et a., 2001). Jakes & Nelson (2007) propose that questions about the relationship between communities and wildfire management, including wildfire mitigation, are important because knowledge of this relationship is incomplete. This research examined the effect of wildfire management undertaken at a community level on property owner adoption of wildfire mitigation measures.

1.3 Research Approach

This research was guided by Paton's (2003) socio-cognitive theoretical framework. This framework outlines a socio-cognitive preparedness/adoption decision-making process (Figure 1). It explains the relationships between factors

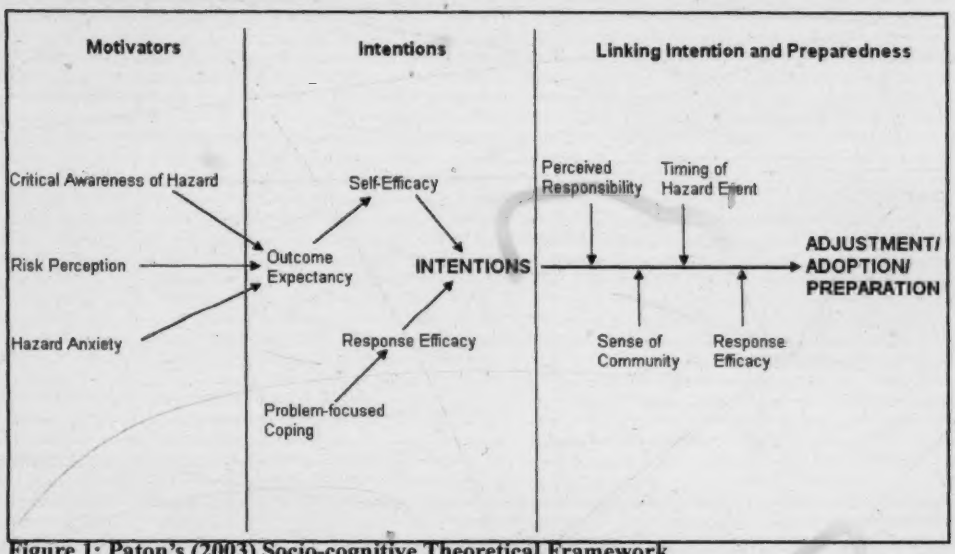

Figure 1: Paton's (2003) Socio-cognitive Theoretical Framework

found to influence intentions to adopt mitigation measures and adoption of mitigation measures (Paton, 2003). As well, the framework incorporates factors, such as awareness, risk perception and hazard timing that are prominent in human dimensions of wildfire

literature (E.g. Martin et al., 2008; McFarlane, 2006; McGee et al., 2005; Nelson et al., 2004; Nelson et al., 2005; Ryan et al., 2006; McFarlane, 2006; McGee et al., 2005; Ryan et al., 2006). This research will test the relationships outlined in Paton's model as well as build on it by including other factors that he did not examine, such as demographics, experience, connection to nature, and social approval, which have also been found by others (Brenkert et al., 2005; McCaffrey, 2008; McFarlane, 2006; McGee et al., 2005; Ryan et al., 2006) to influence adoption of wildfire mitigation measures.

To test and build on this model, as well as meet the research objectives, a questionnaire was used for data collection. A questionnaire allowed for a large sample across geographic regions, to be reached in the same time frame. The questionnaire was sent to 3,452 people in six communities in Alberta: Edson, Grande Cache, High Level, Hinton, Peace River and Whitecourt. A 34 percent response rate was obtained. The following work is an examination of the risk perceptions, motivations, intentions and adoption of residential property owners in Alberta wildland-urban interfaces assessed by the research questionnaire.

1.4 Organization of the Work

In what follows, Chapter 2 presents the literature that provides the theoretical background for this study. The literature review examines literature on environmental hazards, human dimensions of wildfires and the adoption of mitigation measures. Chapter 3 summarizes the methodological approach and analytic strategy. Next, Chapter 4 presents the descriptive statistics results, by

community. These results present wildland-urban interface property owner's risk perception, motivation, intention and adoption of wildfire mitigation measures and in certain cases shows statistically significant differences between communities. Following this, Chapter 5 presents the multivariate and ordinary-least squares regression statistical results and identifies factors that significantly influence adoption of mitigation measures. Chapter 6 describes the implications of the research results and situates the results in regards to the study objectives and human dimensions of wildfire literature. Finally, Chapter 7 describes the implications of this study and provides recommendations for wildfire management agencies.

2.0 Literature Review

The objectives of this research cover a broad spectrum of research areas. This chapter will review the relevant literature. It will begin with a review of environmental hazards research, and then discuss the literature on human dimensions of wildfires, focusing on property owner participation in wildfire mitigation as well as factors affecting these behaviours and preferences. This will be followed by a discussion of the theoretical framework guiding this study. Finally the chapter will conclude with a review of literature on wildfire policy and fuel management preferences with a focus on findings from research on human dimensions of wildfires. This chapter aims to outline the existing literature and provide context for this study.

2.1 Environmental Hazards Research

The term environmental hazard is defined as the "threat potential posed to man or nature by events originating in, or transmitted by, the natural or built environment" (Kates, 1978, p.12). Hazards, such as floods, earthquakes, tsunamis and wildfires, were previously defined as 'natural hazards' but the term natural hazard is no longer sufficient for describing such events as these threats are influenced by technology and human development (Smith, 2004). Combining natural hazards, technological hazards and context threats, ~~such~~ as global warming and air pollution, the term environmental hazard more accurately reflects hazard events today (Kates, 1978; Smith, 2004).

Perspectives on environmental hazards prior to the 1950s viewed environmental hazards, such as earthquakes and flooding, as the result of divine intervention (Smith, 2004). Therefore, these hazards were generally accepted as inevitable, and uncontrollable (Smith, 2004). Despite this perspective, attempts to predict and control hazards date back 4,000 years (Smith, 2004). These attempts led to early environmental hazards research that focused on the physical phenomenon of the hazard and prediction and control of a hazard event through engineering and structural solutions (Smith, 2004). There was little acknowledgement of the cause and affect relationship between humans and hazards until the mid-1900s (Smith, 2004). It was then that Gilbert White recognized this gap in environmental hazards research (Smith, 2004; White, 1973). White determined that environmental hazards and humans are linked through decision-making and introduced a social science perspective into hazard mitigation (Smith, 2004; White & Haas, 1975).

The social science perspective recognizes that the environment and humans are connected. Decisions that humans make about development, population size, and resource management, among others, affect the environment (Smith, 2004). For example, the decision to develop settlements on hazard-prone landscapes, such as flood plains, may result in the destruction of settlements when a hazard event, such as flooding, occurs (Smith, 2004). As well, human development can alter the environmental system which in turn can result in more hazard events (Smith, 2004). This connection between the environment and humans provides a foundation for social science research on environmental hazards.

Environmental hazards literature has grown to examine hazards on many dimensions and analyze hazard related issues, such as perceived risk, mitigation and response, before, during and after a hazard event (Alexander, 1997).

Particular environmental hazards, such as earthquakes, hurricanes, industrial accidents and hazardous material mis-use, are prominent in the environmental hazard literature (E.g. Lindell & Perry, 2000; Summers & Hine, 1997; Whitehead et al., 2000). Until recently, wildfires have received minimal attention, especially in regards to human dimensions of wildfires, such as risk perception, preparedness, mitigation and other factors associated with the interaction of humans and wildfires (McCaffrey, 2004). McCaffrey (2004) suggests that the reason for this gap in research was that in North America, during the 1960s and 1970s, wildfire suppression was generally successful and while wildfires did threaten populations and communities, it was not seen as a significant hazard threat. However, with devastating wildfire seasons resulting in the loss of life and property around the world every year, and climate change forecasts predicting increases in the number and size of future wildfires, the wildfire threat to human populations and settlements is increasing (Peter et al., 2006; Running, 2006). This increasing threat creates an even greater need to understand and analyze human-wildfire interactions (Running, 2006). As a result, in the last decade of the twentieth century, social science research on wildfires increased, particularly in the United States of America and Australia (McCaffrey, 2004).

2.2 Human Dimensions of Wildfires

Studying human dimensions of wildfires is essential because managing wildfires and reducing the threat to human populations and property requires the support, trust, and acceptance of the public (Cortner et al., 1990; Monroe et al., 2003; Field & Jensen, 2005; McFarlane, 2006). Wildfire management cannot be completely effective if communities and individuals are not working together with wildfire managers by completing wildfire mitigation strategies in their own communities and on their own properties (Canadian Wildland Fire Strategy

Assistant Deputy Ministers Task Group, 2005).

Communities and individuals living in wildland-urban interfaces are at threat from wildfires. With forest and other vegetation abutting a community or property, wildfires can be devastating, resulting in the loss of homes, properties and even livelihoods (Anderson & Culbert, 2003; Chisholm Fire Review Committee, 2001). Despite the threat and potential impacts from wildfires, wildland-urban interfaces are attractive locations to live because of their pleasant natural surroundings, the intrinsic values provided by nature, and the proximity to outside recreational activities, such as hiking (Davidson et al., 2003; Partners in Protection, 2003).

In Canada, the population of wildland-urban interfaces is increasing (Beshiri & Bollman, 2001; Peter et al., 2006). With this increase in population as well as a dependency on resources, wildland-urban interfaces are particularly at risk from wildfires (Beshiri & Bollman, 2001; Peter et al., 2006). To reduce this risk, wildfire managers, property owners and communities need to be prepared for wildfires. An understanding of risk perceptions, wildfire management preferences, and property owner willingness to participate in mitigation activities will help individuals, communities and wildfire managers work together to reduce the risk from wildfires.

2.3 Property owner participation in mitigation

In the USA and Australia, a significant amount of research has been conducted in regards to wildland-urban interface property owner participation in mitigation activities (E.g. Brenkert-Smith et al., 2006; Fried et al., 1999; Gardner et al., 1987; McGee & Russell, 2003a; Monroe & Nelson, 2004; Monroe et al., 2003; Nelson et al., 2004; Nelson et al., 2005; Winter & Fried, 2000). Studies in Australia have generally found that residents there had undertaken wildfire

mitigation on their properties and were prepared in the event of a wildfire (Bushnell et al., 2006; McGee & Russell, 2003a). McGee and Russell (2003) found that all of their respondents in North-Central Victoria, Australia, had engaged in some wildfire mitigation activities. Clearing vegetation, mowing the lawn around the home, and removing branches and leaves from eaves and gutters were the most frequently completed activities.

In Thuringawa, Queensland, Australia, almost all of the respondents (94%) had completed action on their property to prepare for wildfires, with the greatest percentage keeping grass short and clearing branches and deadfall from properties, as well as cleaning gutters (Bushnell et al., 2006). Beringer (2000) found that while residents of North Warrandtye, Victoria, Australia had engaged in mitigation activities, wildfire prevention work, such as cleaning gutters and clearing debris was not completed as frequently as it should be by many residents. It was also discovered that non-property owners were less likely to have engaged in wildfire prevention work, suggesting that non-property owners may feel less responsibility for wildfire mitigation than property owners (Beringer, 2000). Results similar to those from Australia were found in a study in comparing preparedness in Minnesota and Florida (Nelson et al., 2005). In both states respondents had undertaken mitigation activities, particularly reducing vegetation around their homes (Nelson et al., 2005). Similarly a study in Michigan, USA found that the majority of residents had already undertaken some wildfire mitigation on their properties and were willing to invest in resources to reduce their risk from wildfires (Fried et al., 1999). A subsequent study by the same authors, however, found that respondents viewed wildfires as random and uncontrollable, and therefore wildfire mitigation activities as ineffective (Winter & Fried, 2000). These residents preferred solutions aimed at reducing wildfire ignition rather than activities they could perform to reduce the wildfire risk on

their properties (Winter & Fried, 2000).

Similarly Gardner et al. (1985) found that the majority of respondents in two California communities, one impacted by wildfire and one not, had done little to mitigate the risk of wildfire to their properties (83 percent in the community impacted by wildfire and 47 percent in the community not impacted by wildfire) (Gardner et al., 1985). Another study in Minnesota found that mitigation differed between seasonal and full time residents with full time residents implementing more mitigation measures (Bright & Burtz, 2006). In southern California, residents at the WUI preferred government mitigation strategies (such as prescribed burning) and did not want to participate in programs aimed at mitigating wildfire risk on their own properties (such as clearing brush) (Gardner et al., 1987). Brenkert-Smith et al. (2005) noted similar attitudes in Colorado, where study participants indicated that property owner mitigation was only beneficial if a wildfire started on private property and that the risk on adjacent public lands made private property mitigation pointless.

To summarize, research in the USA and Australia shows geographic variation in property owner participation in wildfire mitigation. McFarlane (2006) states that the difference in findings across geographic regions identifies a need to further examine property owner wildfire mitigation in Canada. As well, Canada differs from the USA and Australia in terms of vegetation, spatial aspects, values, and culture as well as history of wildfires and as a result research findings are not necessarily transferrable. Also Canadian research published to date has been primarily qualitative (McGee et al., 2005; McFarlane et al., 2007a; McFarlane et al., 2007b; McGee & McFarlane, n.d.; McGee & McFarlane, n.d.) with only three studies using quantitative methods: Zaksek & Arvai (2004) and Arvai et al. (2006) focused on identifying differences between experts and non-experts knowledge and conceptualization of the risks and benefits of wildfires and McGee

(2005) focused on wildfire mitigation in a larger WUI urban centre. While initial Canadian research findings have been consistent, there is a need for further research as these previous studies did not focus specifically on property owner participation in mitigation in smaller WUI centers.

McGee's (2005) study in Edmonton, Alberta examined wildfire perceptions and mitigation on properties directly adjacent to a natural area. McGee (2005) found that the majority of residents surveyed had completed several of the mitigation measures recommended by FireSmart[1]. The three most frequently completed measures were keeping grass mowed, removing needles leaves and overhanging trees and installing double or thermal paned windows. While the majority had completed several of the mitigation measures, they were not necessarily completed to reduce the risk from wildfires, but rather for aesthetic and property maintenance reasons (McGee, 2005).

A qualitative case study of residents in McLure, Louis Creek, and Barriere, British Columbia and Crowsnest Pass and the Municipal District of Pincher Creek, Alberta found similar results in regards to commonly undertaken mitigation activities (McGee et al., 2005). It was also found that a high level of completed wildfire risk reduction activities did not necessarily accompany an increased perception of the risk and that other factors, such as values and financial constraints, encourage or discourage the adoption of wildfire risk reduction activities (McGee et al., 2005).

Interviews conducted in Peace River and Whitecourt, Alberta also support the finding that property owners in Alberta and British Columbia tend to complete the same few wildfire mitigation measures: keeping grass short and watered, installing fire-retardant roofing materials, and tempered or double paned glass for windows and exterior doors and removing needles, leaves and

1. FireSmart is a program for communities and individuals in wildland-urban interface communities that encourages the implementation of specific, proactive measures known to reduce the risk from wildfire to properties, development and infrastructure (Partners in Protection, 2003).

overhanging branches from the roof and gutters (McGee & McFarlane, n.d.). As well, the studies concluded that while most participants engaged in some wildfire mitigation activities, they were generally completed for reasons other than to reduce the risk from potential wildfires.

In summary, while initial Canadian research findings have been consistent, they are limited to Alberta and British Columbia and are primarily qualitative case studies, which limit the transferability of the findings to larger populations. As there is limited quantitative research on property owner participation in wildfire mitigation in Canada, it remains necessary to further examine this topic, particularly property owners' decisions to adopt wildfire mitigation measures, since research shows that a complex set of factors influence property owner participation in wildfire mitigation activities (please refer to the following section of this Chapter) (Martin et al., 2008).

2.4 Theoretical Framework

Human dimensions of wildfire research has found that often property owners decide not to adopt mitigation measures on their properties (Arvai et al., 2006; Martin et al., 2008; McGee, 2005; McGee et al., 2005; Nelson et al., 2004; Winter & Fried, 2000). Hazard reduction research has determined that there are many reasons and underlying dynamics that influence decisions to adopt hazard reduction activities (Paton et al., 2006). Paton (2003) developed a social-cognitive theoretical model to explain the relationship between factors that influence adoption of hazard reduction activities and adoption.

Paton's (2003) model will provide the framework for this research because it addresses the adoption of mitigation measures and accounts for the complexity of hazard reduction decision-making. The model incorporates factors found in human dimensions of wildfire literature, such as awareness, risk perception

and hazard timing (E.g. Martin et al., 2008; McFarlane, 2006; McGee et al., 2005; Ryan et al., 2006). As well, other researchers have employed Paton's (2003) model to study the implementation of earthquake (Paton et al., 2005) and wildfire mitigation measures (McGee, 2005; Paton et al., 2005). Paton et al. (2005) confirmed that the model's three phases (motivation, intention formation and conversion of intentions to preparedness actions) correctly conceptualize earthquake preparedness while McGee (2005) found that the link between intentions and adoption of mitigation measures was not always clear.

It should be noted that Paton's (2003) model uses the terms 'preparedness' and 'adjustment adoption' but for the purposes of this thesis these terms have been replaced with 'adoption of mitigation measures.' Paton's (2003) model was developed in Australia, where 'preparedness' is a more accurate term for the types of activities, such as preparing emergency kits and firefighting equipment, that property owners complete before a wildfire. The term 'adoption of mitigation measures' is a more accurate representation of the activities that Canadian property owner's complete before a wildfire, such as installing fire retardant roofing materials and exterior siding, clearing brush from around the house and removing needles, leaves, and overhanging branches from the roof and gutters. These activities must be completed well in advance of a wildfire and therefore the term 'mitigation measures' is more suited to the Canadian context.

Paton's (2003) model has three phases: motivation formation, intention formation and linking intention and adoption of mitigation measures (Figure 2). For people to implement mitigation measures they must be sufficiently motivated and intention must be high. In the first phase, motivation, Paton identifies risk perception, hazard anxiety and critical awareness as factors that influence motivation to adopt risk reduction activities. Risk perception is the perceived risk from a hazard. Critical awareness is the frequency and extent to which people

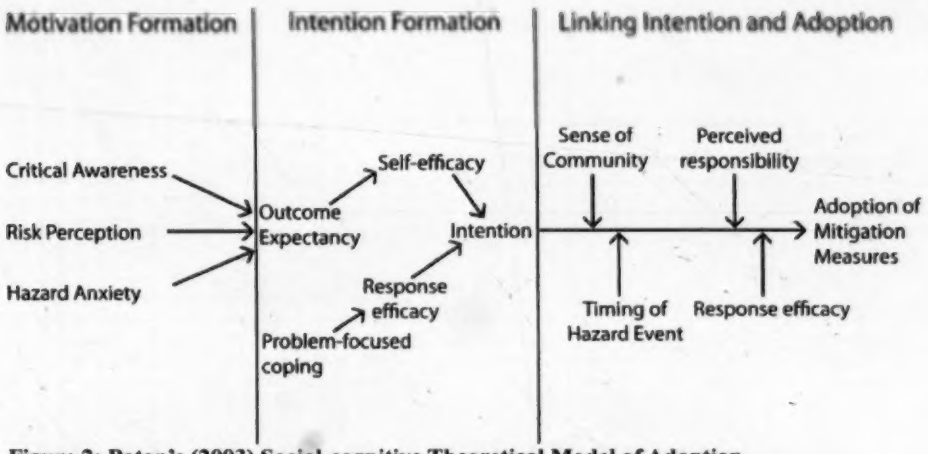

Figure 2: Paton's (2003) Social-cognitive Theoretical Model of Adoption

think and talk about a hazard and hazard anxiety is the level of anxiety a person feels about a hazard. As environmental hazards are often infrequent, unpredictable and uncontrollable, risk perception, anxiety and critical awareness are proposed as motivating or de-motivating factors that influence intentions to adopt mitigation measures.

The next phase of Paton's model is intention formation. The motivating factors, risk perceptions, critical awareness and hazard anxiety, are linked to the intentions phase as direct influences on outcome expectancy. Outcome expectancy is the perception of whether or not personal action will effectively mitigate a problem. Outcome expectancy, along with self-efficacy, problem-focused coping and response efficacy are described as intention forming variables. Self-efficacy is an individual's belief in their own ability to succeed at an action. A sufficiently high level of self-efficacy combined with favourable outcome expectancy will lead to an intention to mitigate. The other intention forming variables are problem-focused coping (a person's predisposition to choose actions intended to change a situation) and response efficacy. Response efficacy is the perception of the availability of resources needed to implement changes or mitigation measures. Problem-focused coping influences intention through response efficacy because while a person may be predisposed to changing a situation, they may not actually

intend to mitigate if they do not believe they have enough resources available to actually implement changes.

Intention was included in the Paton model because the intention forming variables (problem-focused coping, response efficacy, outcome expectancy and self-efficacy) do not influence the adoption of mitigation measures but do influence intentions. There are situations where a person may be restricted in their ability to adopt mitigation measures, such as people who rent their homes and are unable to make decisions about structural changes to the property, despite being problem focused and having a high self-efficacy, response efficacy and outcome expectancy. While there may be an intention, there are factors that moderate the transition from intention to adoption of mitigation measures.

The link between intention and adoption of mitigation measures is moderated by several variables: sense of community (feeling of connection with people or a place), perceived responsibility (the perception of others as responsible for one's safety), timing of a hazard event (length of time or frequency of occurrence) and response efficacy. Paton also includes normative beliefs, factors that reflect actual experience or perceptions formed through interactions with others and the media, but for the purposes of this research the factor normative beliefs was excluded, as such a complex factor can be difficult to measure in a mail-out survey. People with a strong sense of community and a willingness to accept responsibility for their own safety (perceived responsibility) may be more likely to transfer their intentions into adoption of mitigation measures. As well, if a hazard event occurs frequently (timing of a hazard event) then people may be more likely to perceive a sense of urgency and act on their intentions to mitigate. Finally, if people do not perceive there to be enough resources (time, skill, financial, physical) available then response efficacy will be low and the conversion of intentions to adoption of mitigation measures will not

occur.

In summary for people to adopt of mitigation measures, Paton's model indicates that they must transition through the three phases of the social-cognitive decision-making model. Motivation must be sufficiently high and people must feel personally able to create effective change, have the available resources, be problem-focused and believe the recommended mitigation actions are effective to form an intention to mitigate. Intention, once formed, is linked to the adoption of mitigation measures but moderated through variables, including sense of community, perceived responsibility, response efficacy and timing of a hazard event. Paton's (2003) model illustrates that the decision to adopt mitigation measures is a complicated process involving motivation, intentions and both mediating and moderating variables.

Study Limitations

While Paton's (2003) model has been employed in hazards research, it is a relatively new framework. There are limitations to the model which must be taken into consideration. Other researchers have identified factors such as trust in wildfire management agencies, experience with wildfires, perceptions of personal responsibility, personal beliefs about when mitigation measures should be implemented and what represents adequate mitigation that are not included in Paton's model (Collins, 2005; McCaffrey, 2008; McGee et al., 2005; McGee & McFarlane, n.d.; McGee & McFarlane, n.d.; Monroe & Nelson, 2004; Monroe et al., 2003; Nelson et al., 2004; Nelson et al., 2005; Paton et al., 2006; Paton et al., 2005).

As well, risk perception[2] is a complex concept, with many meanings and is negotiated subjectively by each person (Slovic, 1987). Risk can be characterized on many scales and certain characteristics, such as benefits, controllability and

2. In environmental hazards research, perceived risk is often described as the probability of a hazard event occurring in combination with the seriousness of the threat associated with that event (McCaffrey, 2008).

acceptability of the impacts, can explain more variability in risk perceptions (McDaniels et al., 1995; McDaniels et al., 1997). This research will build on Paton's (2003) model by characterizing risk on three scales: general risk perception, acceptability of wildfire risk and controllability of wildfire risk. Research on WUI property owner perceptions of wildfire risk has found that risk perceptions vary depending on many factors including: geography, experience with wildfires, environmental conditions, wildfire awareness, knowledge, length of residence, demographics and the risk-benefit trade off of living in a wildland-urban interface (E.g. Beringer, 2000; Bushnell et al., 2006; Collins, 2005; Fried et al., 1999; Gardner et al., 1987; McCaffrey, 2008; McGee et al., 2005; McGee & Russell, 2003; Monroe & Nelson, 2004; Monroe et al., 2003; Nelson et al., 2004; Nelson et al., 2005; Ryan et al., 2006). Paton's (2003) model does not incorporate these factors. This research aims to test the relationships illustrated in Paton's (2003) model as well as build on it by examining the relationship between risk perception and gender, age, income, education, experience and knowledge (Figure 3).

The influence of gender, age, income, and education, on risk perception will be tested as they are prominent in the risk literature. Gender, in particular, received much attention in the risk literature, with research finding that women tend to have a higher perceived risk than men (Bateman & Edwards, 2002; Davidson & Freudenburg, 1996; Enarson, 1998; Roberts, 1997; Savage, 1993). This difference has been connected to the socialization of men and women in society and underlying social dynamics, such as knowledge, levels of trust in institutions, economic salience and parental roles (Davidson & Freudenburg, 1996). Findings from risk literature also show that people with lower levels of education and lower levels of income perceived greater risks from hazards than other socio-economic groups (Roberts, 1997; Savage, 1993).

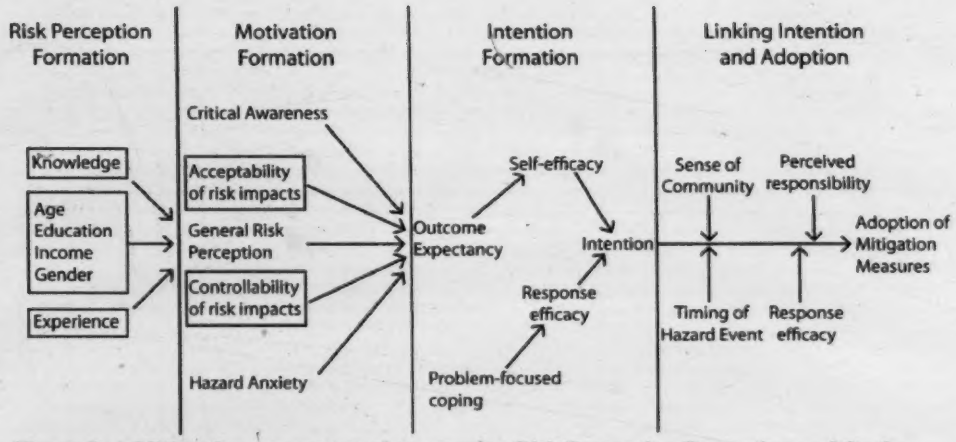

Figure 3: Additional measures tested to examine Risk Perception Formation and further variance in Motivation Formation

Risk perception is also influenced by previous experience with a hazard (Johnston et al., 1999; McGee et al., 2005; Sorensen, 1980). Johnston et al. (1999) found that direct experience with a hazard event increases the perceived risk and is supported by other researchers (McGee & Russell, 2003; McGee et al., 2005; Sorensen, 1980).

Knowledge of the hazard or hazardous event is another factor known to influence risk perceptions (McDaniels et al., 1997). The level of knowledge about a hazard is correlated with lower risk perceptions (Fischoff et al., 2000). Beringer (2000) found that residents in Warrandyte, Victoria, Australia who had lower knowledge levels had lower perceptions of wildfire risk. In recent years information campaigns in Canada have been delivered to residents in forested regions in an attempt to inform them about wildfire risk (Partners in Protection, 2003). It is thought that the greater the knowledge about wildfires, the greater the understanding of the risks involved in living in a WUI but to date no research has been published that tests this link.

Another research aspect that has not been examined, to date, to the best of my knowledge, is the relationship between community level wildfire management and the adoption of mitigation measures by residential property owners.

Communities are places where relationships, values and attitudes unify people and create bonds within a place (Jakes & Nelson, 2007). Community psychology literature on relationships between individuals, communities and society, has found that action taken at a broader community level can have influential effects on action taken by individual members of a community (Dalton et al., 2001). Jakes & Nelson (2007) propose that questions specifically related to communities and wildfire management are important because knowledge of the relationship between communities and wildfires is incomplete. This research hypothesized that wildfire management undertaken at a community level will influence property owner adoption of wildfire mitigation measures.

2.5 Wildfire Policy and Fuel Management Preferences

The third objective of the research study is to examine WUI residential property owners' wildfire management preferences. To successfully implement wildfire management and reduce to the risk from wildfires to property owners and communities public acceptance and support is required (Brunson & Shindler, 2004; Toman et al., 2004; Winter et al. , 2002). Wildfire management includes actions undertaken to reduce wildfire risk to communities by both the municipality (actions such as bylaws and legislation requiring the use of only fire retardant building materials), or by the provincial government (actions such as public education programs like FireSmart, prescribed burning and vegetation thinning on the outskirts of towns) (Partners in Protection, 2003). The provincial government in Alberta, implements FireSmart alongside other wildfire fuel management measures, such as prescribed burning[3], thinning[4] and fireguards[5]

3. Prescribed burning is the deliberate burning of designated areas of land under controlled conditions to reduce the potential intensity, spread and size of wildfires (Canadian Interagency Forest Fire Centre, 2002).
4. Thinning is the selected removal of trees in a forested area to reduce the potential intensity of a wildfire (Canadian Interagency Forest Fire Centre, 2002).
5. Fireguards are designated areas of vegetation that are cleared to reduce the potential spread and size of wildfires (Canadian Interagency Forest Fire Centre, 2002).

(Alberta Sustainable Resource Development, 2004a).

The human dimensions of wildfire management literature has focused on acceptability and preferences for certain techniques (Brunson & Shindler, 2004; Kneeshaw et al., 2004; Loomis et al., 2001; Manfredo et al., 1990; Toman et al., 2004; Wagner et al., 1998; Vogt et al., 2005; Winter et al. , 2006). In Arizona, Cortner et al. (1990) found that residents showed the greatest support for building material restrictions, clearing vegetation and fire education programs. Prescribed burning received mid-level support as a wildfire management technique (Cortner et al., 1990). Brunson and Shindler (2004) found that residents in Utah and Oregon differed on their acceptance of fuel management, such as prescribed fire and fuel reduction through thinning. Oregonians indicated that prescribed fire was an acceptable tool, while Utah residents felt it should be used only at select times (Brunson & Shindler, 2004). In a study by Winter et al. (2006), fuel management preferences of residents in California, Missouri, Michigan and Florida were examined and also found to differ. Positive attitudes towards prescribed burning were twice as high in Florida as in Michigan but positive attitudes towards thinning were much lower in Missouri than in California (Winter et al., 2006). These findings were supported by Manfredo et al. (1990) who compared regional and national attitudes towards prescribed burning. Overall, both the national and regional respondents had positive attitudes towards prescribed burning but residents of Montana and Wyoming (regional) were more supportive of prescribed burning than the general United States population (Manfredo et al., 1990).

Exploratory research in Canada, similarly found that residents of different communities favoured different wildfire management measures (McGee, 2007; McGee & McFarlane, n.d.; McGee & McFarlane, n.d.; McGee et al., 2005; Zaksek & Arvai, 2004; Zaksek & Arvai, 2004). In British Columbia, residents felt that fireguards and prescribed fires were the most effective wildfire management

measures (Zaksek & Arvai, 2004). In Peace River, Alberta, prescribed burning was the most favoured measure amongst study participants (McGee & McFarlane, n.d.). Interviews with residents of Whitecourt, Alberta indicated that fireguards received the greatest amount of support while prescribed burning was the least favoured (McGee & McFarlane, n.d.). Despite the fact that the communities are only a few hundred kilometres apart they greatly differed on their support for prescribed burning as a wildfire management technique. Studies in Banff, Jasper and Hinton found that participants generally supported prescribed burning but that there was some variance in support and concerns for prescribed burning as a fuel management measure (McFarlane et al., 2007a; McFarlane et al., 2007b). A survey of urban residents in Edmonton, Alberta found that prescribed burning was less supported than other measures (McGee, 2007). Education was the most popular management measure but thinning, and building restrictions also received support (McGee, 2007).

Differences in preferences for wildfire management techniques may be due to situational aspects and education. Kneeshaw et al. (2004) found that situational aspects, such as origin of a fire (either lightning or human caused), air quality and damage to property, among others, changed perceptions and acceptance of fire management actions. A study in Oregon found that site visits (bringing people to an area that has experienced prescribed burns or thinning), were not a very effective education tool (Toman et al., 2004) but in a study in Florida, it was found that after educational materials were distributed the acceptance and preference for prescribed fire, in particular, increased (Loomis et al., 2001). Similarly, Ryan et al. (2006) found that the more familiar people were with a fuel management technique, the greater the support for the technique.

This review of the literature shows that preferences for wildfire management techniques vary by communities and regions and that situational

aspects and education influence people's preferences (Kneeshaw et al., 2004; Loomis et al., 2001; Ryan et al., 2006; Wagner et al., 1998). With research findings varying by communities, and a realization that there is a need to effectively communicate with the public and incorporate their preferences into wildfire fuel management techniques, it is necessary to further examine Canadian property owners' wildfire management preferences (Field & Jensen, 2005; McFarlane, 2006).

2.6 Chapter Summary

This chapter discussed literature relevant to environmental hazards, property owner participation in wildfire mitigation, the theoretical framework guiding this study and wildfire management preferences. There is a broad body of literature on environmental hazards and risk perception, and a growing body of literature on human dimensions of wildfires but gaps remain. Studies have shown that wildfire risk perception, preferences for wildfire management techniques and adoption of wildfire mitigation measures varies geographically and can be influenced by major wildfire events (Brunson & Shindler, 2004; Fried et al., 1999; McGee, 2005; McGee & Russell, 2003; Winter & Fried, 2000). Canadian research is this area is still in its infancy and is predominantly qualitative (McGee et al., 2005; McGee & McFarlane, n.d.; McGee & McFarlane, n.d.) with two quantitative studies focusing on differences in wildfire knowledgebetween experts and non experts (Arvai et al., 2006; Zaksek & Arvai, 2004) and wildfire mitigation in an urban context (McGee, 2005). As well, the role of community wildfire management as a determinant of individual property owner adoption of wildfire mitigation measures has yet to be examined. This research proposes to address these gaps in the literature and the next chapter will discuss the methodology employed.

3.0 Methodology

This chapter begins by providing a general overview of quantitative and qualitative research methods, and then summarizes the aims and challenges of these methods. Following this, a discussion of the socio-cognitive theory guiding this research is presented. Next the study design, including descriptions of the selected study communities, survey protocol and sampling procedures, is outlined. Finally the analytic strategy is presented.

3.1 Research Methods

Human geography and the other social science disciplines commonly employ both quantitative and qualitative research methods. Recent human dimensions of wildfire research in Canada, specifically conducted by Dr. Tara McGee at the University of Alberta and Dr. Bonita McFarlane at the Canadian Forest Service, generally employed qualitative research methods to explore and study Canadians and wildfires. This use of qualitative methods led to the identification of factors, such as risk perceptions, constraints and knowledge, associated with wildfire mitigation at the property owner, community and governmental levels (McGee et al., 2005; McFarlane et al., 2007a; McFarlane et al., 2007b; McGee & McFarlane, n.d.; McGee & McFarlane, n.d.). The work completed by Dr. McGee and Dr. McFarlane provides the foundation for future human dimensions of wildfire research in Canada (McFarlane, 2006). This thesis aims to build upon their work by conducting quantitative research that is

transferable across larger populations.

3.2 Research Design

Quantitative research methods test hypotheses using statistical analysis and are commonly used for descriptive and explanatory research, as they provide opportunity for replication and can make inferences to a larger population (Neuman, 2000). Generally quantitative research follows a deductive direction, beginning with a logical relationship, theory or concept and testing it against empirical data to provide evidentiary support for the relationship or theory (Neuman, 2000). This research begins with a theoretical framework then uses a mail-out survey to collect data to test the theoretical framework.

A mail-out survey was employed because the study covers a large geographical area and a large sample size is required to provide results that make inferences to a larger population. A mail-out survey is more cost effective, less time consuming and allows for a dispersed population to be sampled simultaneously, especially compared to a telephone or interview style survey (McNeish, 2000). While an internet survey has many of the same benefits of a mail-out survey, there remain many disadvantages, including an inability to verify respondent information, security and privacy concerns, and computer literacy and internet access issues (McNeish, 2000). For the purposes of this research a mail-out survey provides the most appropriate data collection method.

3.3 Sampling Frame

Six wildland-urban interface communities in Alberta were selected to comprise the sampling frame. The six communities of Edson, Grande Cache, High Level, Hinton, Peace River and Whitecourt were chosen with the assistance of the Canadian Forest Service and Alberta Sustainable Resource Development.

Figure 4 shows the location of

the six communities within Alberta and Table 1 summarizes the populations, private dwellings and economic dependencies of the communities. All of the communities are wildland-urban interface communities and are economically resource dependent, with almost all of the communities dependent on the forestry and oil and gas sectors (Town of Grande Cache, n.d.; Town of Hinton, 2007; Town of Peace River, n.d.; Town of Edson, 2007; Town of High Level, n.d.; Town of Whitecourt, n.d.). The total populations range from 3,783 (Grande Cache) to 9,738 (Hinton) and the total number of private dwellings range from 1,505 (Grande Cache) to 3,913 (Hinton) (Statistics Canada, 2008). Edson, Hinton and Whitecourt are the largest of the six sample communities while Grande Cache, High Level and Peace River are smaller communities. The province of Alberta is divided into Forest Management Areas with each area responsible for wildfire and forest management actions within their boundaries. Edson and Hinton are located in the Foothills Forest Management Area, while Grande Cache is located in the Smoky Management Area, Whitecourt in the Woodlands Management Area, Peace River in the Peace Management Area and High Level in the Upper Hay Management Area (as seen in Figure 5).

Table 1. *Community Profiles*

	Edson	High Level	Peace River	Grande Cache	Hinton	Whitecourt
Total Population[1]	8,098	3,887	6,315	3,783	9,738	8,971
Total Private Dwellings[2]	3,230	1,519	2,526	1,505	3,913	3,448
Resource Dependent[3]	Yes (Forestry, coal, oil and gas)	Yes (Agriculture, forestry, oil and gas)	Yes (Agriculture, forestry, oil and gas)	Yes (Forestry, coal, oil and gas)	Yes (Forestry and coal)	Yes (Forestry, oil and gas)

[1] Statistics Canada (2007)

[2] Statistics Canada (2007)

[3] Town of Edson (2007), Town of Grande Cache (n.d.), Town of High Level (n.d.), Town of Hinton (2007), Town of Peace River (n.d.), Town of Whitecourt (n.d.)

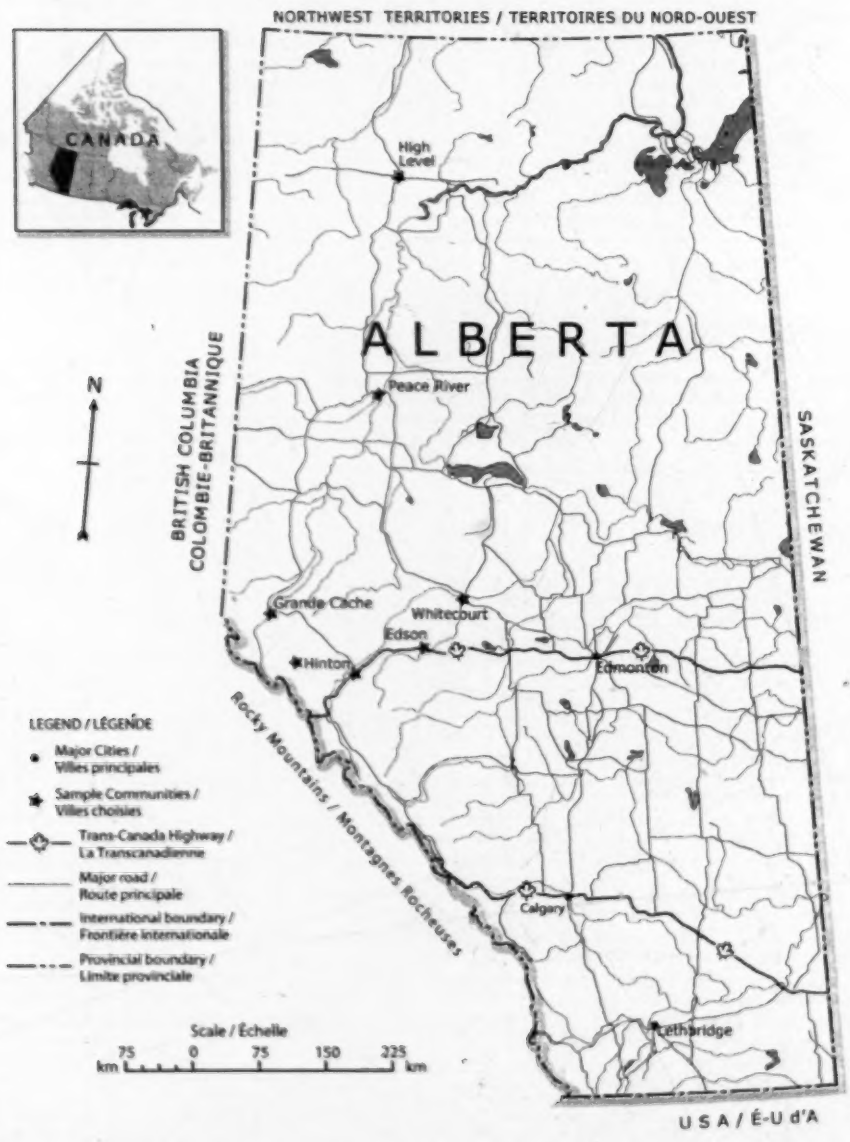

Figure 4: Map of Sample Communities. Modified from Natural Resources Canada (2001).

3.3.1 Community Selection Criteria

The six communities were selected based on two criteria: (1) wildfire threat potential and (2) level of community wildfire management. Communities with higher wildfire threat potentials and varying levels of community wildfire management were selected. Alberta Sustainable Resource Development assesses the wildfire threat potential of a community by evaluating negative

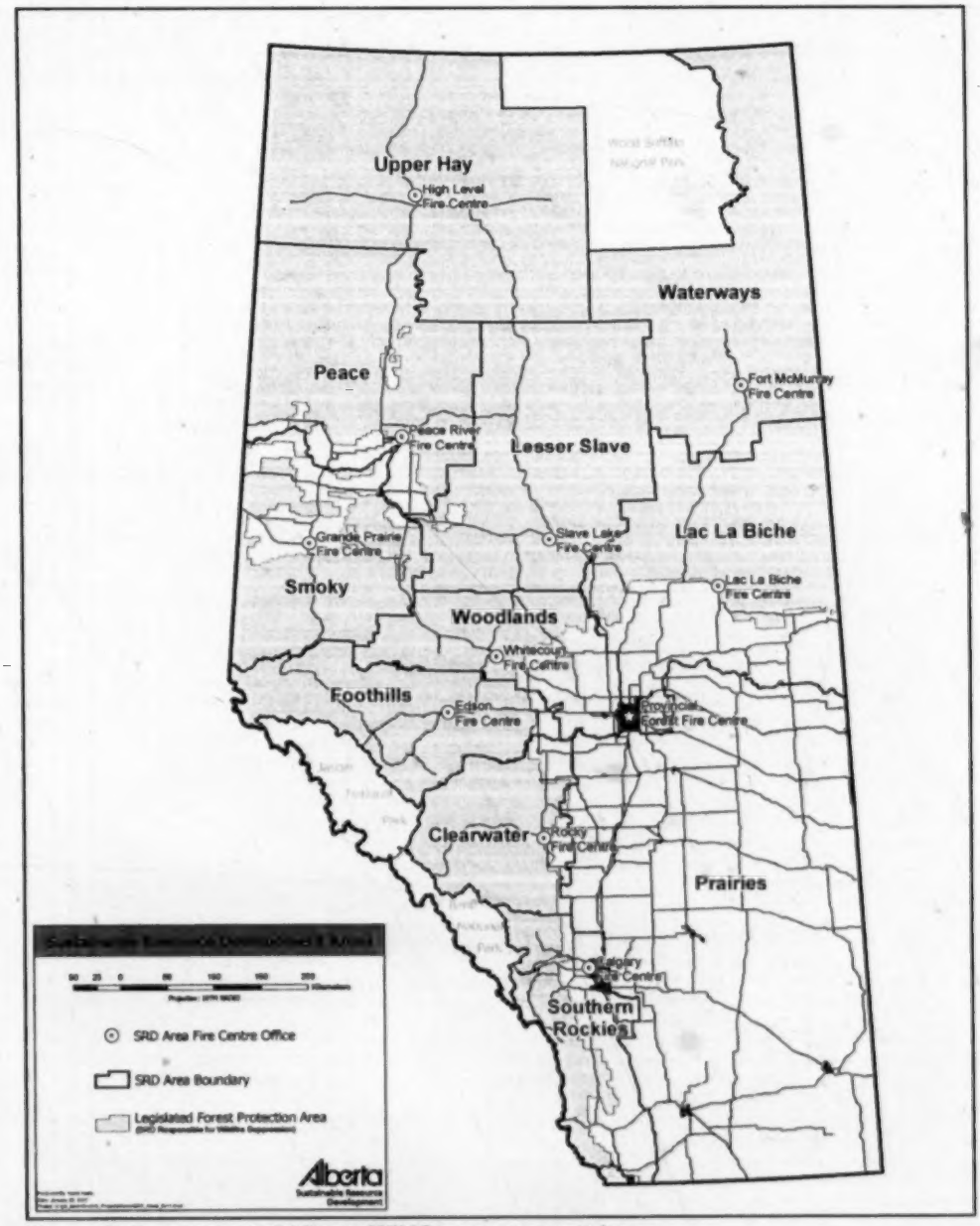

Figure 5: Government of Alberta Wildfire management Areas
Source: Alberta Sustainable Resource Development (2007)

social, economic and ecological impacts from wildfire including fire behavior potential, fire occurrence risk, values at risk and suppression capabilities (Alberta Sustainable Resource Development, 2004b). The fire behaviour potential assesses fuels, fire weather, topography and existing barriers to fire spread, among other

criteria, to determine the way fuel will ignite, and how the fire will develop and spread. The fire occurrence risk is the probability of a fire starting based on weather, fuel moisture, seasonal assessments and causes of ignition. Values at risk are resources, developments, or man-made improvements to the natural environment in a specific area that have measurable or intrinsic worth and could be destroyed or altered by wildfire. Alberta Sustainable Resource Development includes values such as human life, communities, infrastructure, natural resources, and watersheds and soils as priorities in fire suppression (Alberta Sustainable Resource Development, 2004b). Finally, suppression capability is assessed based on the factors and limitations, such as terrain, water availability and initial attack response time, that are related to the ability to contain a detected wildfire and protect values at risk. Based on a combination of these criteria Alberta Sustainable Resource Development has mapped wildfire threat potential for all communities in the province. Appendix B shows the overall wildfire threat potential maps for each community in this study, as obtained from Alberta Sustainable Resource Development.

The communities were also selected based on their levels of community wildfire management. The purpose of such selection was to determine if community level wildfire management influences property owner wildfire mitigation. Community level wildfire management was defined as any action taken in or around a community by private companies or municipal or provincial governments to mitigate the threat of wildfire or prepare a community in the event of a wildfire. These actions can include community plans, vegetation or fuel management, such as thinning[1], prescribed burning[2], and fireguards[3],

1. Thinning is the selected removal of vegetation in forested areas. It is a technique used to decrease the strength of a potential wildfire (Collins, 2005).
2. Prescribed burning is the deliberate burning of vegetation under controlled conditions (i.e. firefighters are on site watching) that is used to stop or slow the spread of a potential wildfire an decrease the chance of fire in the future (Collins, 2005).
3. Fireguards (or fuel breaks) are areas of vegetation around communities that are modified or cleared to help stop or slow the spread of a potential wildfire (Collins, 2005).

public education programs, and bylaws specifically targeted at wildfire risk reduction. For the purpose of this research, a town's level of community wildfire management was determined by examining the specific wildfire mitigation actions taken at a community level.

Alberta Sustainable Resource Development works with communities in Alberta to develop a Wildland-Urban Interface Plan and or a Community Zone Plan. These plans involve consultation between the provincial government and the community with the goal of reducing the threat from potential wildfires to the community and surrounding areas (Alberta Sustainable Resource Development, 2006b). A Wildland-Urban Interface Plan includes the area within a town's boundaries, and focuses on mitigating wildfires through fuel management, education, legislation, development, planning, training and interagency cooperation (Alberta Sustainable Resource Development, 2006b).

A Community Zone Plan, applies outside a Wildland-Urban Interface Plan boundaries, and assesses the town's wildfire threat, identifies fuel modification to be completed, conducts FireSmart workshops, and supports the creation of a FireSmart community program (Alberta Sustainable Resource Development, 2006b). As well, a community zone plan completes hazard reduction burning around the town, works with utility companies (E.g. Alta Power Corp) to create fuel breaks, and outlines annual actions for maintaining and managing the risk from wildfires(Alberta Sustainable Resource Development, 2006b).

The towns of Grande Cache, Hinton and Whitecourt were selected to be part of the sample because they exhibited moderate to high levels of community wildfire management. Hinton and Grande Cache had completed a Wildland-Urban Interface Plan and a Community Zone Plan (Alberta Sustainable Resource Development, 2005; Alberta Sustainable Resource Development , 2006a; Alberta Sustainable Resource Development, 2004c). Both Hinton and Grande Cache

have identified values at risk, had extensive education campaigns, completed fuel modification (such as thinning and the creation of fuel breaks) and monitored all water sources and other barriers to fire spread (Adam Gossell, FireSmart Community Planning Specialist, personal communication, April 17, 2007, Alberta Sustainable Resource Development, 2004b).

Whitecourt has a moderate level of community wildfire management. Whitecourt implemented its Community Zone Plan but had completed fewer activities than Hinton and Grande Cache (Alberta Sustainable Resource Development, 2005; Alberta Sustainable Resource Development , 2006a; Alberta Sustainable Resource Development, 2004c). Whitecourt's Community Zone Plan identified many recommendations. To date several of the recommendations have been completed, including hazard reduction burning (prescribed burning to reduce the threat from potential wildfires), hazard assessments, cross training with Whitecourt's fire department and the forest protection department as well as public FireSmart workshops (Alberta Sustainable Resource Development , 2006a).

Edson, High Level and Peace River had very little to no community wildfire management (Adam Gossell, FireSmart Community Planning Specialist, personal communication, January 15, 2007). High Level and Peace River have not completed any wildfire mitigation strategies (Alberta Sustainable Resource Development, 2006b). However, as of May, 2007, when the survey was mailed out, the Town of Edson completed a FireSmart Community Grant application and received financial assistance for the development of a Wildland-Urban Interface plan but had not actually developed a plan or initiated any education programs or fuel management strategies (Adam Gossell, FireSmart Community Planning Specialist, personal communication, April 17, 2007, 2007).

3.4 Sample selection

Within the six study communities, single-family residential property owners were selected as the sample population. Single-family residential property owners refers to owners of property that is designated for one single-family dwelling per lot or one unit of a duplex on a single lot (Town of Whitecourt, 1996; Town of Edson, n.d.). The sample population excluded residents of mobile home parks, apartment buildings, and condominiums (higher density areas) as they often do not own their own unit or the land and have restrictions on the types of activities that can be implemented on their properties (E.g. condominium regulations on landscaping). As the majority of the FireSmart activities that can be done to reduce the potential impact from a wildfire are structural, such as the use of fire resistant roofing or siding materials and double or thermal paned windows or require landscaping changes, these residents would be unable to implement the majority of these activities (Partners in Protection, 2003).

As well, the sample was limited to single-family residential property owners who reside within each of the town boundaries and for whom Alberta Land Titles had a valid mailing address. Those property owners who reside outside of town boundaries are also at risk from potential wildfires but obtaining accurate information about the owners of such properties would have required a considerable amount of effort and time as county legal land description and land use maps are quite large, and residential properties outside of town boundaries are very spread out which would make it difficult and time consuming to accurately locate all of the residential properties.

The sample population was obtained by first acquiring a legal land description map of each community. The legal land description is the system used by Alberta Land Titles to identify subdivided plots of land (Government of Alberta, n.d.). It is comprised of the plan number, block number and lot number.

The maps showing the legal land descriptions for each town were manually overlaid with the land use maps for each town. Overlaying the land use map on the legal land description maps allowed for only properties that were zoned as single-family residential to be identified. The identified properties then comprised the sample population.

3.5 Sample Size

From this sample population, the sample size was calculated. As the six communities were divided into the two categories of moderate to high community wildfire management and none to low community wildfire management, the communities were not treated independently when calculating the sample size. Using Dillman's (2007) sample size formula[4], a statistically significant sample size for each of the two categories was determined. The sample size is accurate to ± 5 percent, 19 times out of 20 and the use of Dillman's (2007) formula helps to ensure that the research findings will be relatively representative of the total population and reduce sampling error (Dillman, 2007).

The total sample size was calculated by adding together the required sample size for the moderate to high community wildfire management group[5] (N=667) and the none to low community wildfire management group (N=350), resulting in a total required sample size of 1,017. It was assumed that only thirty percent of those sampled would respond and as a result the total sample size was

4. Dillman's (2007) sample size formula:

$$Ns = \frac{(Np)(p)(1-p)}{(Np-1)(B/C)^2+(p)(1-p)}$$

Ns = completed sample size needed for desired level of precision
Np = size of population
P = proportion of the population expected to choose one of the two response categories (50%)
B = acceptable amount of sampling error (± 5%)
C = Z statistic associated with the confidence level (1.96 = 95% confidence)

5. It should be noted that the sample size for the moderate to high community level wildfire management group was much higher than the none to low community level wildfire management group because Hinton was treated specially in order for Hinton's results to be used in another study.

increased to 3,391 to account for this assumption. Finally, 10 more properties were added to each community for good measure, which resulted in a total sample size of 3,452. The sample only included property owners with mailing addresses in the towns that were sampled. Simple random sampling was then used to determine which properties were included in the sample. Each property in each town was assigned a number, and then a random number generator was used to select which properties to include in the sample. Properties with more than one owner were dealt with by randomly selecting just one owner to whom the questionnaire would be addressed. Those people who owned more than one property in the sample population were dealt with by randomly keeping only one property so that one person did not receive multiple copies of the questionnaire.

3.6 Survey Design

The design of a questionnaire is a critical component in quantitative research and is an important tool for increasing response rates (Dillman, 2007). Dillman's "Mail and Internet Surveys The Tailored Design Method" (2007) clearly outlines many principles and suggestions for designing surveys and as a result was chosen to direct the survey protocol. The Tailored Design Method involves carefully timed mailings, design elements and personalized contacts with the sample population, such as personalizing the letter (Dillman, 2007). Dillman's (2007) method is supported by other research methods literature (E.g. Fowler Jr., 1995) and is used widely (McNeish, 2000; Neuman, 2000).

The study questionnaire drew upon Dillman's design principles. Copies of the questionnaire, cover letters and reminder postcard used in this study are in Appendix B. The questionnaire was printed in booklet format with clear, legible large font. The cover page was appealing with a photograph of a beautiful home situated in the forest (Dillman, 2007). The questions included focused on

risk perception, attitudes towards wildfires, knowledge of wildfire and wildfire mitigation measures, willingness to engage in mitigation activities, demographic factors and social and psychological characteristics.

The first question, which pertains to risk from hazards that may affect people and communities in Alberta, was intended to be applicable to all respondents (Dillman, 2007; Fowler Jr., 1995). Potentially objectionable questions, such as questions about income and age, were placed at the end of the questionnaire (Dillman, 2007). The majority of the questionnaire used closed questions. Closed questions provide specific response categories for the respondent, allowing for comparisons between responses (Dillman, 2007; Neuman, 2000). The questionnaire avoided the use of jargon, ambiguous wording, double-barreled questions, leading questions and did not ask questions that were considered beyond the respondents' capabilities. These strategies were all employed in order to ensure that the respondents found the questionnaire easy to fill out, interesting and appealing.

Prior to distribution of the survey, a small pilot test of seventeen administrative staff in the Earth and Atmospheric Sciences department at the University of Alberta, selected friends, who reside in two of the study communities, and selected family members was conducted (N=26). The people who participated in the pilot test were all homeowners who reside either in the greater Edmonton region, Edson, or Peace River with six living directly next to wildland spaces. Nine were male and the rest were female. They ranged in age from 26 to 56. The levels of education also ranged from high school to one post-graduate degree, with the majority having completed a post-secondary education. Those who participated in the pilot test were provided a cover letter and questionnaire and asked to fill out the questionnaire as if they had received it at home through the mail. After participants completed the questionnaire, they

were asked a series of questions about their perceptions of the survey package and questionnaire, such as their reaction to the cover page and first question, and whether they understood all the words or if they found any part difficult.

The questionnaire and cover letter were also reviewed by colleagues, and staff at Alberta Sustainable Resource Development to ensure that there were no problematic questions or other errors. This strategy for pretesting the questionnaire was consistent with the literature which suggests that questionnaires be reviewed by knowledgeable colleagues, tested by a small pilot study, evaluated for cognitive and motivational qualities and finally checked for any previously missed issues (Dillman, 2007; Fowler Jr., 1995; Sudman, 1983). Once the design process and pilot test were completed at the end of May, 2007[6], an initial questionnaire, cover letter, thank you pen and business reply envelope were mailed to the sample. The survey package was personalized and addressed to a specific individual, as research has shown that personalized contacts can increase response rates (Dillman, 2007). A pen was included in the initial survey package as a token of gratitude for respondents filling out the questionnaire. One week after the initial survey mail-out a reminder postcard was mailed to the same individual. One month after the initial mail-out a second questionnaire, letter and business reply envelopes were mailed to those who had not responded. This approach was used because research literature shows that the more contacts made with a respondent, such as pre-notification letters, initial questionnaires, and reminder postcards, the higher the response rate (Clendenning, Field, & Jensen, 2004; Dillman, 2007).

3.7 Ensuring Rigor

Ensuring rigor when conducting a mail-out survey requires attention to

6. It should be noted that the 2007 Alberta wildfire season started later due to cool temperatures in April and a slow retreat of the winter snowfall (Natural Resources Canada, 2007).

many details, including the sampling methods, survey design, implementation, response rates and survey errors. Decreasing errors will increase the reliability and validity of the data (Dillman, 2007; Neuman, 2000). Through various strategies coverage error, sampling error, measurement error and nonresponse error were all minimized or reduced. Coverage error occurs when all the units of a defined population do not have an equal chance of being included in the sample (Dillman, 2007; Dillman & Bowker, 2001). This type of error was minimized by simple random sampling, which ensured that all single-family residential property owners in each town, except those without a valid mailing address, had an equal chance of being selected.

Sampling error can occur when a sample of the population is surveyed rather than the entire population (Dillman, 2007; Dillman & Bowker, 2001). Sampling error was mitigated by restricting the sample to only single-family residential property owners in each community as it was possible to obtain a relatively accurate and complete population size. It should be noted that property owners for whom Alberta Land Titles did not have a mailing address were not included in the sample. This may have resulted in some sampling error as it was not possible to survey these people.

Measurement error, which occurs when respondents answer inaccurately due to poor question wording, survey mode effects or aspects of the respondent's behaviour, was mitigated through careful question design and pretesting (Dillman, 2007; Dillman & Bowker, 2001). Non-response error occurs as a result of non-responses from people who were sampled but did not respond but if they had responded would have answered differently than those who did respond to the survey (Dillman, 2007). Non-response error was mitigated by having a large enough sample size that the results would be representative of the entire population, even if some did not respond. Respondents were also encouraged to

respond by providing them with a 'thank you' pen. Every effort was made through sampling methods, survey design and the implementation process to minimize or reduce these errors and ensure the reliability and validity of the data.

3.8 Analytic Strategy

Data analysis involved multivariate analysis, using the software SAS 9.1. The analysis proceeded in two stages: First, descriptive statistics, such as frequencies and means, were analyzed using ANOVA, chi-square and t-tests to assess whether property owner mitigation levels, means and distributions differ by community. Second, ordinary least-squares regression was used to model social, psychological, and demographic factors influencing the adoption of mitigation measures, to determine how these measures explain the relationship between property owner's risk perceptions, motivations, intentions and wildfire mitigation adoption levels.

3.9 Chapter Summary

In this chapter, an overview of quantitative research methods was provided, along with an overview of the research methods employed in this research. The survey design, sample selection and survey implementation were directed by Dillman's (2007) Tailored Design Method, a method used by other researchers (E.g. Fowler Jr., 1995; McNeish, 2000; Neuman, 2000). Six geographically disperse communities in Alberta comprise the sampling frame and as a result a mail-out survey was employed to collect data on wildfire risk perceptions, wildfire management preferences and factors motivating the intention and adoption of recommend wildfire mitigation measures by property owners. The next chapter presents the descriptive statistical results of this research survey.

4.0 Descriptive Results

This chapter presents the descriptive statistical results for the variables measuring the formation of risk perception, motivation and intention to adopt and adoption of wildfire mitigation measures, as well as wildfire management and suppression preferences. As well, this chapter aims to meet two of the objectives of this study: (1) to examine both WUI residential property owner's risk perception, motivation, intention and adoption of wildfire mitigation measures, and differences among communities with lower and higher levels of community level wildfire management and (2) to examine WUI residential property owner's wildfire management preferences. Through means and proportion comparisons and an analysis of variance, factors influencing WUI residential property owner's motivation, and intention to adopt and adoption of wildfire mitigation measures will be examined among each of the communities to determine if responses differ by community level wildfire management.

The statistics are based on 1,209 survey responses. An overall response rate of 34 percent was obtained. Table 2 breaks down the response rates by community and community level wildfire management group. The response rates ranged from 26 percent (High Level) to 37 percent (Hinton). No opinion or does not apply responses were treated as missing. It should be noted here that missing data may have resulted in the loss of some information but it was not perceived to be a large enough problem that it would affect the results or conclusions from this study.

Table 2. *Survey response rates, by community*

	Total No. of Single Family Residential Properties	Total Sample Required	Total Sampled	No. Returned	Percent Error	Response Rate
Moderate to High Community Level Wildfire Management	5,212	668	2256	798	3%	35%
Grande Cache	974	276	373	121	8%	32%
Hinton	2,160	326	1098	410	4%	37%
Whitecourt	2,078	324	785	267	6%	34%
None to Low Community Level Wildfire Management	3,872	350	1,196	411	5%	34%
Edson	1,661	312	510	186	7%	36%
Peace River	1,527	307	470	168	7%	36%
High Level	684	246	216	57	12%	26%
TOTALS	9,084	1017	3542	1,209	3%	34%

4.1 Demographics

To provide context for the research results, the demographic composition of the study sample will first be presented. An analysis of variance and mean and proportion comparisons for demographic variables are presented in Table 3. Overall, the male-female ratio of respondents was fairly equal. The percentage of female respondents was greater than males for the towns of Edson, Peace River, and Hinton. The town of Grande Cache had an equal number of female as male respondents. Male respondents exceeded female respondents for the towns of High Level and Whitecourt. For all communities the greatest proportion of respondents had a college or trades certificate (ranging from about 30 to 40 %) or university degree or higher educational attainment. Peace River had the highest proportion with a university education (31%). There were no significant differences among the communities in terms of educational attainment.

The mean age ranged from 44.55 (Whitecourt) to 52.25 (Grande Cache). The mean age of respondents is statistically significant, with differences between Grande Cache, Edson, High Level and Whitecourt and Whitecourt and Hinton, Grande Cache, and Peace River. The mean age of respondents from Grande Cache was statistically higher than the age of respondents in Edson, High Level and Whitecourt, and the mean age of Whitecourt respondents was statistically

Table 3. *Means and Proportions for Demographic Variables, by Community*

		Low Community Level Wildfire Management			Moderate to High Community Level Wildfire Management		
	ANOVA	Edson	High Level	Peace River	Grande Cache	Hinton	Whitecourt
	F-value	*(n = 186)*	*(n = 57)*	*(n = 168)*	*(n= 120)*	*(n = 410)*	*(n = 268)*
Gender[1]							
Female		52.78	44.64	56.36	50.00	50.74	41.13
Male		47.22	55.36	43.64	50.00	49.26	58.87
Educational Attainment[2]							
Less than high school		12.85	6.12	8.75	13.76	11.68	7.45
High school		23.46	14.29	16.88	18..35	19.29	23.14
Some post-secondary		10.06	12.24	13.75	16.54	10.66	15.29
College or trades		35.75	40.82	30.00	35.78	36.04	37.25
University or greater		17.88	26.53	30.63	15.60	22.34	16.86
Age	7.50***	47.66 (14.65)bc	44.77 (10.82)bc	48.51 (12.44)ac	52.25 (12.88)a	49.14 (12.96)ac	44.55 (12.48)b
Income	5.15**	80738.26 (28713.26) ab	87358.49 (24818.65) ac	83466.67 (27757.02) ab	73883.5 (32906.08)b	78735.63 (27741.27) bc	87757.85 (25047.61)a
Length of Residence	8.57***	19.73 (16.93)ac	16.28 (12.05)bc	20.66 (15.09)ac	19.76 (12.50)ab	22.39 (14.98)a	15.37 (11.68)b

Note: The *F* statistic is computed from a one-way analysis of variance and letters indicate Tukey's results

*** $p < 0.0001$, ** $p < 0.001$

[1] $\chi 2\ (5, 1140) = 12.08$, $p = 0.0337$

[2] $\chi 2\ (20, 1146) = 29.81$, $p = 0.0730$

lower than the age of respondents in Hinton, Grande Cache and Peace River. Significant differences are also evident for the mean household income level and length of residence. Total household income (before tax in 2006) was measured in 6 categories. The categories were converted to thousands of dollars based on the midpoints of the categories. The midpoints ranged from $10,000 to $110,000 and the highest mean household income was for Whitecourt ($87,757.87) with the lowest mean household income being Grande Cache ($73,883.50). The highest mean length of residence is Peace River (20.66 years) and the lowest mean length of residence is Whitecourt (15.37 years). The mean differences in age, income and length of residence suggest that respondents differ among the communities. Demographic differences between the communities may contribute to differences in risk perceptions, motivations, intentions and adoption of mitigation measures. An analysis of variance provides further evidence of community differences but when the demographic results were aggregated and examined by community level wildfire management groups, no significant differences were found between the two groups of respondents (Table 4).

A comparison of the sample demographics with readily available Statistics Canada data for the province of Alberta was unable to be done because of the nature of the study sample. Statistics Canada community data includes all persons, where as this study only sampled property owners 18 years of age or older. For this reason, a comparison would not be valid.

4.2 Intention to Adopt and Adoption of Wildfire Mitigation Measures

Both the intention to adopt wildfire mitigation measures and adoption of wildfire mitigation measures were measured in the study using the FireSmart's landscape and structural risk reduction activities[1] that can be completed on and

1. Landscape level wildfire mitigation activities include actions taken around a property such as keeping grass short and watered, storing firewood well away from a house, removing overhanging branches and leaves from roofs and gutters, screening eaves and the underside of balconies and

Table 4. *Means and Proportions for Demographic Variables, by Community Wildfire Management Level*

		Low Community Level Wildfire Management	Moderate to High Community Level Wildfire Management
		Low Group	High Group
	t-value	*(n=411)*	*(n=798)*
Gender[1]			
Female		53.12	47.40
Male		46.88	52.60
Educational Attainment[2]			
Less than high school		10.31	10.55
High school		19.59	20.45
Some post-secondary		11.86	13.06
College or trades		34.02	26.41
University or greater		24.23	19.53
Age	-0.60	47.60 (13.29)	48.09 (13.06)
Income	1.04	82897.73 (27768.08)	80979.23 (28167.24)
Length of Residence	-0.02	19.62 (15.60)	19.64 (13.93)

* $p < 0.05$

[1] χ^2 (1, 1190) = 3.4747, $p = 0.0623$

[2] χ^2 (4, 1146) = 3.5023, $p = 0.4775$

around residential properties. Table 5 presents the mean intention and adoption scores by community.

Intention was measured by respondents indicating their intention to complete an activity on two scales: one for landscaping activities ('plan to do in the next year', 'plan to do in the next 5 years' and 'do not plan to do.') and one for structural activities ('plan to do in 'the next five years', 'plan to do when it needs replacing' and 'do not plan to do.'). Two scales were used as people often take longer to complete structural activities, such as re-roofing, which require more time and money than landscaping activities. Respondents were scored based on their levels of intention, receiving a 0 if they had already done an activity or if it did not apply to them, a 1 for indicating that they planned to do a landscaping activity in the next year or a structural activity in the next five years, a 2 if they planned to landscaping activity in the next five years or a structural activity if it

decks. Structural level wildfire mitigation activities include actions taken that modify the structure of a house, such as installing fire retardant roofing and siding materials, as well as installing double or thermal paned glass in windows and exterior glass doors (Partners in Protection, 2003).

needs replacing, and finally respondents received a 3 if they did not plan to do an activity. The intention score for each activity was then summed and the two scales combined to create a total intention score.

Intention scores had a possible range from 1 (high level of intention) to 39 (low or no level of intention). All of the communities had fairly high levels of intention (between 8 and 11). Respondents from Grande Cache had the highest level of intention to adopt wildfire mitigation measures and High Level respondents had the lowest level. However, an analysis of variance showed that the level of intention did not statistically differ among the communities.

Adoption of wildfire mitigation measures was measured based on respondents indicating if an activity was completed/done for each of the 13 recommended wildfire mitigation measures. Responses were summed to create a score for the number of mitigation activities completed. Higher scores reflect the completion of more mitigation activities. Adoption of all wildfire mitigation measures was examined together and the adoption of landscape measures and structural measures were also examined separately.

The range of possible adoption scores was from 0 (none or low level of adoption) to 13 (highest level of adoption). Participants in all of the communities

Table 5. *Intention to Adopt and Actual Adoption of Mitigation Measures, by Community*

		Low Community Level Wildfire Management			Moderate to High Community Level Wildfire Management		
	ANOVA	Edson	High Level	Peace River	Grande Cache	Hinton	Whitecourt
	F-value	*(n = 186)*	*(n = 57)*	*(n = 168)*	*(n= 120)*	*(n = 410)*	*(n = 268)*
Summed Score							
Intention	1.33	30.67 (6.21)	29.26 (6.35)	29.52 (6.10)	31.06 (6.05)	30.35 (5.75)	30.09 (6.03)
Mean No. of Activities Completed							
Adoption (All)	0.40	6.80 (2.98)	7.02 (3.03)	6.69 (2.78)	6.93 (2.76)	6.34 (2.94)	6.63 (2.86)
Adoption (Landscape)	0.25	5.08 (2.52)	5.47 (2.71)	5.23 (2.31)	5.17 (2.51)	5.13 (2.55)	5.18 (2.52)
Adoption (Structural)	2.95*	1.72 (1.09)	1.54 (1.00)	1.46 (1.05)	1.76 (1.00)	1.51 (1.04)	1.45 (1.01)

Note: The *F* statistic is computed from a one-way analysis of variance

*$p<0.05$

had moderate levels of adoption (mean score ranging from 6.34 to 7.02). Respondents from Hinton had completed the fewest wildfire mitigation activities on their properties (6.34) while respondents from High Level had completed the most (7.02). When adoption is divided into adoption of landscape mitigation measures and structural mitigation measures, similar results were evident. Adoption of landscape measures ranged from 0 to 10 and the mean level of adoption ranged from 5.08 to 5.47. Respondents from Edson completed the fewest landscape level activities (5.08) while respondents from High Level completed the most (5.47). Adoption of structural measures ranged from 0 to 3. The mean level of structural activity adoption ranged from 1.45 for Whitecourt to 1.76 Grande Cache. Respondents from Whitecourt, on average, completed the fewest structural level mitigation measures while respondents from Grande Cache completed the most. An analysis of variance showed that there were only differences between the communities in terms of the adoption of structural mitigation measures ($p<0.05$). Despite the F-value for structural adoption being significant, Tukey's results indicate that there were no comparisons significant at the $p<0.05$. There were no significant differences between communities in terms of intentions or adoption of all mitigation measures.

Further evidence that actions taken at a community level do not impact property owner intentions or adoption of wildfire mitigation measures is shown in Table 6. Neither the intention nor the adoption scores significantly differ by community wildfire management level. Despite there being no statistically significant differences, respondents from communities with moderate to high levels of community wildfire management had higher intentions and respondents from low group had slightly higher adoption of mitigation measures.

4.2.1 Completion of Wildfire Mitigation Measures

The percentage of respondents from each community who completed, plan

Table 6. *Intention to Adopt and Actual Adoption of Mitigation Measures, by Community Wildfire Management Level*

	t-value	Low Community Level Wildfire Management *(n = 411)*	Moderate to High Community Level Wildfire Management *(n= 798)*
Score			
Intention	-0.96	29.99 (6.20)	30.36 (5.89)
Adoption (All)	0.63	6.79 (2.90)	6.68 (2.89)
Adoption (Landscape)	0.29	5.20 (2.46)	5.15 (2.53)
Adoption (Structural)	1.05	1.59 (1.07)	1.53 (1.03)

to complete or do not plan to complete each of the wildfire mitigation measures was also assessed to determine the popularity of and distribution of responses for each activity. Table 7 presents the proportions for landscape wildfire mitigation measures. Landscape wildfire mitigation measures include activities that can be completed around the property that do not require major changes to a structure or a house, such as keeping grass short and watered frequently during the spring, summer and fall and storing firewood well away from the house (Partners in Protection, 2003). The majority of respondents, in each of the communities, had done most of the landscape activities.

Overall the most popular mitigation measures were measures that were part of normal property maintenance. The landscape level activity that the greatest majority of respondents had completed is keeping grass short and watered frequently (over 84 percent). This result is to be expected as it is generally part of normal property maintenance. Removing shrubs, trees or fallen branches close to your house, and removing needles, leaves and overhanging branches the roof and gutter are activities that more than 50 percent of respondents in each community had completed. These activities are also generally associated with normal property maintenance which may contribute to their popularity. Mitigation measures that less than 50 percent of respondents had completed are landscaping with fire resistant materials, screening house vents, gutters and eaves with metal mesh and

Table 7. *Percent Completion of Landscape Wildfire Mitigation Measures, by Community*

	Low Community Level Wildfire Management			Moderate to High Community Level Wildfire Management		
	Edson	High Level	Peace River	Grande Cache	Hinton	Whitecourt
	(n = 186)	*(n = 57)*	*(n = 168)*	*(n= 120)*	*(n = 410)*	*(n = 268)*
Keep grass short and watered frequently						
Done	86.96	92.73	90.36	84.75	89.58	89.47
Plan to do in next year	1.63	1.82	0.60	4.24	1.99	2.63
Plan to do in next 5 years	0.00	0.00	0.00	1.69	0.00	1.13
Do not plan to do	5.98	3.64	5.42	4.24	4.47	4.14
Does not apply	5.43	1.82	3.61	5.08	3.97	2.63
Remove shrubs, trees or fallen branches close to your house						
Done	63.04	57.89	63.25	65.83	63.18	68.56
Plan to do in next year	6.52	10.53	3.01	0.83	5.97	3.79
Plan to do in next 5 years	1.09	1.75	0.60	2.50	1.00	0.38
Do not plan to do	9.78	15.79	17.47	10.00	12.19	12.12
Does not apply	19.57	14.04	15.66	20.83	17.66	15.15
Thin shrubs or tress so that nearby plans and trees do not touch						
Done	44.57	45.61	39.39	47.50	41.6	47.74
Plan to do in next year	4.35	7.02	8.48	4.17	9.02	6.39
Plan to do in next 5 years	0.54	1.75	1.82	2.50	2.51	1.50
Do not plan to do	19.02	24.56	24.24	12.50	16.79	17.29
Does not apply	31.52	21.05	26.06	33.33	30.08	27.07
Store firewood well away from your house						
Done	45.86	64.91	46.11	48.33	46.31	50.75
Plan to do in next year	3.87	1.75	3.59	4.17	3.94	4.51
Plan to do in next 5 years	1.66	0.00	0.00	0.83	0.25	1.13
Do not plan to do	4.42	7.02	11.38	6.67	10.84	9.77
Does not apply	44.20	26.32	38.92	40.00	38.67	33.83
Remove needles, leaves and overhanging branches from the roof and gutter						
Done	65.76	56.14	65.87	57.50	65.51	58.05
Plan to do in next year	15.22	10.53	17.96	11.67	10.92	15.36
Plan to do in next 5 years	1.63	7.02	1.20	0.83	1.74	0.75
Do not plan to do	3.26	3.51	1.20	0.83	1.74	1.87
Does not apply	14.13	22.81	13.77	29.17	20.10	23.97

Table 7 continued. *Percent Completion of Landscape Wildfire Mitigation Measures, by Community*

	Low Community Level Wildfire Management			Moderate to High Community Level Wildfire Management		
	Edson	High Level	Peace River	Grande Cache	Hinton	Whitecourt
	(n = 186)	*(n = 57)*	*(n = 168)*	*(n= 120)*	*(n = 410)*	*(n = 268)*
Landscape with fire resistant materials and vegetation						
Done	34.24	46.43	32.93	35.04	33.17	36.88
Plan to do in next year	7.07	1.79	4.27	5.13	6.23	8.37
Plan to do in next 5 years	3.26	8.93	4.27	3.42	5.24	4.56
Do not plan to do	32.07	28.57	36.59	30.77	33.67	30.80
Does not apply	23.37	14.29	21.95	25.64	21.70	19.39
Remove debris or needle build up under balconies and porches						
Done	52.97	60.71	58.08	62.18	54.07	54.51
Plan to do in next year	7.57	5.36	5.39	1.68	7.41	9.77
Plan to do in next 5 years	1.08	3.57	0.60	0.84	0.49	0.38
Do not plan to do	2.16	0.00	4.19	5.04	4.2	1.88
Does not apply	36.22	30.36	31.74	30.25	33.83	33.46
Prune large trees by removing all branches that are close to the ground						
Done	55.68	57.89	61.68	49.15	56.25	55.30
Plan to do in next year	9.19	7.02	11.98	4.24	7.50	5.68
Plan to do in next 5 years	1.08	1.75	1.80	0.85	2.75	2.65
Do not plan to do	9.19	5.26	9.58	8.47	6.75	8.33
Does not apply	24.86	28.07	14.97	37.29	26.75	28.03
Screen house vents, gutters and the underside of eaves with metal mesh						
Done	31.67	33.33	37.80	38.98	38.58	29.01
Plan to do in next year	10.56	3.51	12.20	10.17	8.38	11.07
Plan to do in next 5 years	4.44	8.77	6.10	6.78	5.33	6.49
Do not plan to do	37.22	42.11	34.15	27.12	36.04	41.98
Does not apply	16.11	12.28	9.76	16.95	11.68	11.45
Screen or enclose the underside of decks and porches						
Done	33.88	36.84	33.53	31.93	35.06	33.33
Plan to do in next year	10.93	17.54	7.78	8.40	10.12	13.26
Plan to do in next 5 years	2.73	7.02	2.99	1.68	3.46	4.92
Do not plan to do	26.23	22.81	28.14	27.73	23.95	27.65
Does not apply	26.23	15.79	27.54	30.25	27.41	20.83

screening or enclose the undersides of decks and balconies.

Table 8 presents the percentage of respondents who had completed, plan to complete or do not plan do complete structural wildfire mitigation measures. Structural wildfire mitigation measures include actions such as installing fire retardant roofing materials, double/thermal pane or tempered glass in windows and exterior glass doors and fire resistant exterior siding. For all of the communities over 50 percent of respondents had installed fire retardant roofing materials and double or thermal pane or tempered glass in windows and

Table 8. *Percent Completion of Structural Wildfire Mitigation Measures, by Community*

	Low Community Level Wildfire Management			Moderate to High Community Level Wildfire Management		
	Edson	High Level	Peace River	Grande Cache	Hinton	Whitecourt
	(n = 186)	*(n = 57)*	*(n = 168)*	*(n= 120)*	*(n = 410)*	*(n = 268)*
Intall fire retardant roofing materials						
Done	67.76	59.65	58.54	64.17	54.61	59.18
Plan to do in next 5 years	2.19	3.51	6.10	2.50	5.74	4.12
Plan to do when it needs replacing	7.10	5.26	7.32	11.67	13.47	7.12
Do not plan to do	18.58	31.58	23.78	17.50	23.44	25.47
Does not apply	4.37	0.00	4.27	4.17	2.74	4.12
Install double/thermal pane or tempered glass in windows and exterior glass doors						
Done	52.97	70.18	55.42	73.33	57.88	53.38
Plan to do in next 5 years	8.11	3.51	10.84	7.50	9.36	9.77
Plan to do when it needs replacing	14.05	8.77	10.84	10.00	13.05	10.53
Do not plan to do	21.62	17.54	20.48	5.83	17.73	21.80
Does not apply	3.24	0.00	2.41	3.33	1.97	4.51
Intall fire resistant exterior siding						
Done	53.80	25.00	34.34	38.66	40.39	32.96
Plan to do in next 5 years	3.80	1.79	5.42	3.36	5.91	6.74
Plan to do when it needs replacing	7.61	7.14	7.83	11.76	11.08	9.74
Do not plan to do	29.35	66.07	45.78	42.02	39.66	46.82
Does not apply	5.43	0.00	6.63	4.20	2.96	3.75

exterior glass doors. The proportion of respondents who had installed fire resistant exterior siding was lower than the proportion who had installed fire resistant roofing materials and double or thermal paned glass for all of the communities except Edson. Just over 50 percent of respondents from Edson had installed fire resistant siding, while it was completed by 25 to 40 percent of respondents in other communities. Overall, installing fire retardant roofing materials and double/ thermal paned or tempered glass in windows and exterior glass doors were the structural activities most often completed.

Chi-square tests, which measure the relationship between categorical variables, were used to examine whether completion of mitigation activities statistically differed by community. The results showed that only three of all the wildfire mitigation activities (both landscape and structural), at the $p<0.05$ level (Table 9) differed by community: removing needles, leaves and overhanging branches from the roof and gutter, installing double/thermal paned or tempered glass in windows and exterior glass doors and installing fire resistant exterior siding. These results indicated that the majority of activities are completed equally

Table 9. *Chi-square values for completion of all Wildfire Mitigation Measures, by Community*

	Chi-square for Communities
Keep grass short and watered frequently	χ^2 (20, 1192) = 21.1104, p = 0.3907
Remove shrubs, trees or fallen branches close to your house	χ^2 (20, 1193) = 25.5022, p = 0.1829
Thin shrubs or tress so that nearby plans and trees do not touch	χ^2 (20, 1191) =22.5484, p = 0.3115
Store firewood well away from your house	χ^2 (20, 1197) = 24.5524, p = 0.2191
Remove needles, leaves and overhanging branches from the roof and gutter	χ^2 (20, 1198) = 38.818, p = 0.0070
Landscape with fire resistant materials and vegetation	χ^2 (20, 1192) = 16.5832, p = 0.6799
Remove debris or needle build up under balconies and porches	χ^2 (20, 1198) = 25.5598, p = 0.1808
Prune large trees by removing all branches that are close to the ground	χ^2 (20, 1191) = 29.3472, p = 0.0811
Screen house vents, gutters and the underside of eaves with metal mesh	χ^2 (20, 1192) = 23.1483, p = 0.2816
Screen or enclose the underside of decks and porches	χ^2 (20, 1195) = 19.3768, p = 0.4975
Intall fire retardant roofing materials	χ^2 (20, 1192) = 31.1064, p = 0.0538
Install double/thermal pane or tempered glass in windows and exterior glass doors	χ^2 (20, 1200) = 33.3017, p = 0.0313
Intall fire resistant exterior siding	χ^2 (20, 1198) = 48.6989, p =0.0003

across all communities. While, chi-square test results, showed that three of the activities differed by community (Table 9), Tables 10 and 11 show that there were statistically no difference in the completion of all of the wildfire mitigation activities between community level wildfire management groups. This result, similarly, shows that the completion of wildfire mitigation activities does not vary at the community level.

The impact of community level wildfire management on the completion of wildfire mitigation activities was also examined. Table 10 and 11 present the percentages of respondents who had completed, plan to complete or do not plan to complete mitigation activities by community level wildfire management group. The results show similar findings as Tables 7 and 8: keeping grass short and watered frequently was the activity completed the most for both community wildfire management level groups. Less than 40 percent of respondents from both types of communities had landscaped with fire resistant materials and vegetation, screened house vents, gutters and the underside of eaves with metal mesh or enclosed the underside of decks and porches. The installation of fire retardant roofing materials and double/thermal paned or tempered glass in windows and exterior glass doors was also completed by a greater percentage of respondents in both community types than the installation of fire resistant siding materials.

4.2.2 Evacuation Plans

Along with measuring adoption of wildfire mitigation measures, respondents were asked about their preparedness in the event of a wildfire specifically in regards to evacuation plans. Table 12 presents the percentage of respondents who had created, plan to create or do not plan to create an evacuation plan. Overall the proportion of respondents in each community who had created an evacuation plan varied. With the exception of Peace River and Grande Cache, only about a third of respondents in each community had completed an evacuation

Table 10. *Percent Completion of Landscape Wildfire Mitigation Measures, by Community Wildfire Management Level*

	Low Community Level Wildfire Management (*n = 411*)	Moderate to High Community Level Wildfire Management (*n= 798*)
Keep grass short and watered frequently[1]		
Done	89.14	88.82
Plan to do in next year	1.23	2.54
Plan to do in next 5 years	0.00	0.64
Do not plan to do	5.43	4.32
Does not apply	4.20	3.68
Remove shrubs, trees or fallen branches close to your house[2]		
Done	62.41	65.39
Plan to do in next year	5.65	4.45
Plan to do in next 5 years	0.98	1.02
Do not plan to do	13.76	11.83
Does not apply	17.20	17.31
Thin shrubs or tress so that nearby plans and trees do not touch[3]		
Done	42.61	44.59
Plan to do in next year	6.40	7.39
Plan to do in next 5 years	1.23	2.17
Do not plan to do	24.92	16.31
Does not apply	24.84	29.54
Store firewood well away from your house[4]		
Done	48.64	48.11
Plan to do in next year	3.46	4.17
Plan to do in next 5 years	0.74	0.63
Do not plan to do	7.65	9.85
Does not apply	39.51	37.24
Remove needles, leaves and overhanging branches from the roof and gutter[5]		
Done	64.46	61.77
Plan to do in next year	15.69	12.53
Plan to do in next 5 years	2.21	1.27
Do not plan to do	2.45	1.65
Does not apply	15.19	22.78

[1] $\chi^2(4, 1192) = 5.6389, p = 0.2278$

[2] $\chi^2(4, 1193) = 1.9657, p = 0.7421$

[3] $\chi^2(4, 1191) = 6.7747, p = 0.1483$

[4] $\chi^2(4, 1197) = 2.1843, p = 0.7019$

[5] $\chi^2(4, 1198) = 12.3566, p = 0.0149$

Table 10 continued. *Percent Completion of Landscape Wildfire Mitigation Measures, by Community Wildfire Management Level*

	Low Community Level Wildfire Management (*n* = 411)	Moderate to High Community Level Wildfire Management (*n*= 798)
Landscape with fire resistant materials and vegetation[1]		
Done	35.40	34.70
Plan to do in next year	5.20	6.79
Plan to do in next 5 years	4.46	4.74
Do not plan to do	33.42	32.27
Does not apply	21.52	21.50
Remove debris or needle build up under balconies and porches[2]		
Done	56.13	55.44
Plan to do in next year	6.37	7.34
Plan to do in next 5 years	1.23	0.51
Do not plan to do	2.70	3.54
Does not apply	33.57	33.17
Prune large trees by removing all branches that are close to the ground[3]		
Done	58.44	54.86
Plan to do in next year	10.02	6.39
Plan to do in next 5 years	1.47	2.43
Do not plan to do	8.80	7.54
Does not apply	21.27	28.78
Screen house vents, gutters and the underside of eaves with metal mesh[4]		
Done	34.41	35.4
Plan to do in next year	10.22	9.56
Plan to do in next 5 years	5.74	5.94
Do not plan to do	36.66	36.69
Does not apply	12.97	12.41
Screen or enclose the underside of decks and porches[5]		
Done	34.15	34.01
Plan to do in next year	10.57	10.91
Plan to do in next 5 years	3.44	3.68
Do not plan to do	26.54	25.76
Does not apply	25.31	25.64

[1] $\chi^2(4, 1185) = 1.2659, p = 0.8671$

[2] $\chi^2(4, 1192) = 5.6389, p = 0.2278$

[3] $\chi^2(4, 1198) = 2.8438, p = 0.5843$

[4] $\chi^2(4, 1191) = 0.2785, p = 0.9912$

[5] $\chi^2(4, 1195) = 0.1480\ p = 0.9974$

Table 11. *Percent Completion of Structural Wildfire Mitigation Measures, by Community Wildfire Management Level*

	Low Community Level Wildfire Management *(n = 411)*	Moderate to High Community Level Wildfire Management *(n= 798)*
Intall fire retardant roofing materials[1]		
Done	62.87	57.61
Plan to do in next 5 years	3.96	4.70
Plan to do when it needs replacing	6.93	11.04
Do not plan to do	22.52	23.22
Does not apply	3.71	3.43
Install double/thermal pane or tempered glass in windows and exterior glass doors[2]		
Done	56.37	58.71
Plan to do in next 5 years	8.58	9.22
Plan to do when it needs replacing	12.01	11.74
Do not plan to do	20.59	17.3
Does not apply	2.45	3.03
Intall fire resistant exterior siding[3]		
Done	41.87	37.63
Plan to do in next 5 years	4.19	5.81
Plan to do when it needs replacing	7.64	10.73
Do not plan to do	41.13	42.42
Does not apply	5.17	3.41

[1] $\chi^2(4, 1192) = 6.3621, p = 0.1737$

[2] $\chi^2(4, 1200) = 2.2947, p = 0.6817$

[3] $\chi^2(4, 1198) = 7.4275, p = 0.1150$

Table 12. *Evacuation Plan Decisions, by Community*

	Low Community Level Wildfire Management			Moderate to High Community Level Wildfire Management		
	Edson *(n = 186)*	High Level *(n = 57)*	Peace River *(n = 168)*	Grande Cache *(n= 120)*	Hinton *(n = 410)*	Whitecourt *(n = 268)*
Evacuation Plan[1]						
Done	34.25	33.93	49.70	42.61	26.90	35.77
Plan to do	35.36	30.36	32.12	36.52	47.21	41.15
Do not plan to do	30.39	35.71	18.18	20.87	25.89	23.08

[1] $\chi^2(10, 1171) = 38.9506, p < 0.0001$

plan and approximately another third did not plan to create a plan at all. Over 40 percent of respondents in Peace River and Grande Cache have created a plan. The chi-square test showed that there was a relationship between community level wildfire management groups and respondents' decisions to complete evacuation plans. When the data was aggregated and the percentage of respondents who had created a plan was examined by community wildfire management level, more respondents from communities with moderate to high levels of community wildfire management had an evacuation plan ($p<0.05$) (Table 13). This result suggests that decisions to create an evacuation plan differ by community level wildfire management.

4.3 Risk Perception

Table 14 presents an analysis of variance and means comparison for measures of risk perception. Risk perception was measured on a scale of 1 (no risk to oneself or ones' property in the next five years) to 7 (great risk to oneself or ones' property in the next five years). When perceived wildfire risk was measured relative to other hazards, such as mountain pine beetle, and flooding, wildfires had a moderate perceived risk rating. For the communities of Grande Cache, Hinton and Whitecourt, communities with wildfire experience and moderate to high levels of community wildfire management, wildfires had the second highest perceived risk rating. Mountain pine beetle had the highest

Table 13. *Evacuation Plan Decisions, by Community Wildfire Management Level*

	Low Community Level Wildfire Management *(n = 411)*	Moderate to High Community Level Wildfire Management *(n= 798)*
Evacuation Plan[1]		
Done	34.25	42.61
Plan to do	35.36	36.52
Do not plan to do	30.39	20.87

[1] $\chi^2(2, 1171) = 12.4730$, $p = 0.0020$

Table 14. *Risk Perception Indicators, by Community*

		Low Community Level Wildfire Management			Moderate to High Community Level Wildfire Management		
	ANOVA	Edson	High Level	Peace River	Grande Cache	Hinton	Whitecourt
	F-value	*(n = 186)*	*(n = 57)*	*(n = 168)*	*(n= 120)*	*(n = 410)*	*(n = 268)*
Hazard Risk Perception							
Wildfire	17.00***	3.60 (1.59)	3.46 (1.79)	3.45 (1.61)	4.93 (1.79)a	4.30 (1.76)b	4.30 (1.73)b
Hail	9.76***	4.46 (1.61)a	3.21 (1.58)c	3.90 (1.41)bc	3.52 (1.76)c	3.72 (1.59)bc	4.07 (1.54)ab
Climate Change	1.94	3.78 (2.02)	3.27 (1.65)	4.11 (1.72)	3.94 (2.11)	3.79 (1.83)	3.89 (1.81)
Drought	2.16	3.34 (1.80)	3.21 (1.52)	3.68 (1.72)	3.15 (1.65)	3.36 (1.73)	3.58 (1.61)
Tornadoes	19.20***	2.93 (1.72)a	3.69 (1.90)bc	2.77 (1.56)ab	1.97 (1.44)c	2.05 (1.36)c	2.95 (1.53)a
Mountain Pine Beetle	17.37***	4.49 (2.05)ab	2.17 (1.52)a	4.64 (2.10)bc	5.86 (1.77)e	5.41 (1.81)de	5.07 (1.89)cd
Flooding	63.65***	3.25 (1.90)a	2.43 (1.70)bc	4.97 (2.06)	2.01 (1.40)c	2.30 (1.57)c	3.12 (1.92)ab
Wildfire Risk Perception							
Wildfire risk to property	12.80***	3.22 (1.63)a	3.02 (1.77)a	3.25 (1.69)a	4.50 (1.90)c	3.85 (1.78)b	3.86 (1.72)b
Wildfire risk to community	15.20***	4.03 (1.58)a	3.96 (1.65)a	4.11 (1.54)a	4.96 (1.82)b	4.84 (1.43)b	4.81 (1.37)b
Wildfire risk to environment	3.75*	5.16 (1.71)ab	4.88 (1.67)b	5.24 (1.55)ab	5.68 (1.63)a	5.44 (1.60)ab	5.56 (1.42)a
Controllability							
Controllability of wildfires impacts to property	3.02*	5.08 (1.75)ab	5.60 (1.47)b	5.25 (1.58)ab	4.79 (1.56)a	4.92 (1.58)a	5.10 (1.53)ab
Controllability of wildfire impacts to community	2.44	4.87 (1.56)	5.20 (1.42)	4.82 (1.44)	4.61 (1.56)	4.62 (1.44)	4.82 (1.31)
Controllability of wildfire impacts to environment	1.75	4.01 (1.78)	4.36 (1.79)	3.84 (1.61)	3.86 (1.77)	3.81 (1.66)	4.07 (1.50)

Note: The *F* statistic is computed from a one-way analysis of variance and letters indicate Tukey's results

*** $p < 0.0001$, * $p < 0.05$

Table 14 continued. *Risk Perception Indicators, by Community*

		Low Community Level Wildfire Management			Moderate to High Community Level Wildfire Management		
	ANOVA	Edson	High Level	Peace River	Grande Cache	Hinton	Whitecourt
	F-value	*(n = 186)*	*(n = 57)*	*(n = 168)*	*(n= 120)*	*(n = 410)*	*(n = 268)*
Acceptability							
Acceptability of wildfire impacts to property	0.65	2.14 (1.74)	2.24 (1.85)	2.07 (1.68)	2.13 (1.77)	1.96 (1.64)	2.15 (1.65)
Acceptability of wildfire impacts to community	0.76	2.24 (1.69)	2.35 (1.71)	2.13 (1.47)	2.21 (1.82)	2.13 (1.65)	2.36 (1.63)
Acceptability of wildfire impacts to environment	0.48	3.49 (2.16)	3.62(2.31)	3.53 (2.00)	3.83 (2.22)	3.63 (2.08)	3.66 (1.90)
Likelihood a wildfire will occur in the next year	5.54***	3.32 (1.17)ac	3.20 (1.30)abc	3.24 (1.30)a	3.67 (1.16)bc	3.59(1.14)bc	3.68(1.10)b
Hazard Anxiety	1.64	4.16 (2.13)	3.84(1.97)	3.87 (2.06)	4.48 (2.20)	4.24 (2.01)	4.15 (1.98)

Note: The F statistic is computed from a one-way analysis of variance and letters indicate Tukey's results

*** $p < 0.0001$

Statistically significant differences between the communities in terms of perceived wildfire risk to community and the natural environment are also apparent. Respondents from Grande Cache, Hinton and Whitecourt had statistically higher mean perceptions of risk from wildfires to their communities than respondents from Edson, High Level and Peace River at the $p<0.0001$ level. In terms of perceived wildfire risk to the environment, respondents from Grande Cache had the highest mean perception of risk. Respondents from High Level had the lowest mean perception of risk to the environment and had a statistically lower perception of risk than respondents from Grande Cache and Whitecourt (at the $p<0.05$ level).

The perceived controllability of wildfires was also measured on a scale of 1 (not at all controllable) to 7 (very controllable). Wildfires impacts were generally considered to be highly controllable, particularly to property ($M>4.75$) (Table 14). For all communities the mean level of controllability of impacts to property is higher than the controllability of impacts to the community. The controllability of the impacts from wildfires to the natural environment has the lowest mean level of controllability across all communities.

The differences in perceived controllability of wildfire impacts to property is statistically significant at a $p<0.05$ level. Respondents from Edson, Grande Cache, Hinton, Peace River and Whitecourt have statistically similar perceptions of controllability of wildfire impacts to property but respondents from High Level have statistically higher perceptions of controllability than respondents from Grande Cache and Hinton. There are no significant differences in perceptions of the controllability of wildfire impacts to the community or the natural environment. Respondents from all communities had similar perceptions of the controllability of wildfires to their communities and the natural environment.

Acceptability of wildfires in terms of their general impact to property,

perceived risk for all of the communities except High Level. This result is to be expected as the threat from Mountain Pine Beetle is prominent in Alberta and is receiving much attention in the media and public arenas, particularly in forest communities. Statistically, Grande Cache respondents had a higher perception of risk from wildfires than all of the other communities. Respondents in Hinton and Whitecourt have statistically similar perceptions of the wildfire risk and statistically higher perceptions of risk than respondents in the low community level wildfire management group (Edson, High Level and Peace River). The respondents in the low wildfire management community group have no observed differences in wildfire risk perception.

Risk perception was examined further by examining wildfire risk perception at different scales (risk to own property, risk to the community and risk to the environment) as well as the controllability and acceptability of wildfire risk at these scales. On a scale of 1 (no risk) to 7 (great risk), respondents' perceived risk from wildfires to their property, their community and the natural environment in the next five years was examined. There was a lower perception of wildfire risk to property (M>3.00) than the risk to the community and the environment and the mean perception of risk increased with each scale (property, community, and environment). Respondents from all communities indicated the lowest mean perceptions of risk from wildfires, in the next five years, was to their own property and the greatest risk was to the environment (M>4.50). In terms of wildfire risk to their own property, respondents from Grande Cache, were the only group to have a high perception of risk (M>4.00) at a p<0.0001 level. Respondents from Hinton and Whitecourt have statistically similar perceptions of risk from wildfires to their properties and differed from all other communities. Respondents from Edson, High Level and Peace River also had similar, lower perceptions of risk from wildfires.

community and the natural environment was measured on a scale of 1 (not at all acceptable) to 7 (completely acceptability) (Table 14). The generally lower means for all communities suggest that the impacts from wildfires are not acceptable at the property, community or environment level (Table 14). Respondents, across all communities, are generally more accepting of the impacts from wildfires to the natural environment than the impact to their property or community. As well, there were no significant differences in respondents' perception of the acceptability of wildfire impacts to property, community and the natural environment among all the communities.

Respondents' perceptions of the likelihood of a wildfire occurring in the next year near their community and hazard anxiety levels were also examined (Table 14). The likelihood that a wildfire would occur near their community in the next year was measured on a scale of 1 (very unlikely) to 5 (very likely). For all of the communities the mean likelihood that a wildfire would occur in the next year is between 3.20 and 3.68, indicating that respondents considered it likely that a wildfire occurring in the next year.

Significant differences in the likelihood of a wildfire occurring in the next year are apparent among the communities (at a $p<0.0001$ level). Respondents from Edson, High Level and Peace River had statistically similar lower perceptions about the likelihood of a wildfire occurring in the next year. Respondents from High Level, Grande Cache, Hinton and Whitecourt also were found to have similar higher perceptions but respondents from Whitecourt indicated that a wildfire in the next year was significantly more likely to occur than respondents from Edson and Peace River. Comparatively, respondents from Peace River indicated a significantly lower likelihood of a wildfire occurring than respondents from Grande Cache, Hinton and Whitecourt. This result suggests perceptions of the likelihood of a wildfire occurring differ by community.

Hazard anxiety is the amount of negative emotion, such as anger or fear that is felt towards wildfire and its impacts on respondents and their property. Responses were measured on a scale of 1 (none) to 7 (high). Respondents' mean levels of hazard anxiety ranged from 3.84 to 4.48 (Table 14). This finding suggests that there is a high amount of negative emotion attached to wildfire impacts. Respondents from High Level had the lowest amount of negative emotion while respondents from Grande Cache had the highest. An analysis of variance showed that across all the communities, hazard anxiety levels are similar.

To further test the differences between communities, Table 15 presents the means for risk perception indicators by community level wildfire management groups. The results are similar to the results by community, presented in Table 14. Relative to other hazards, mountain pine beetle was the greatest perceived risk for respondents from both groups, wildfires were the second greatest perceived risk for respondents from the moderate to high level of wildfire management group and the third greatest perceived risk for respondents from the low group. As well, respondents from communities with moderate to high levels of wildfire management had statistically higher perceptions of wildfire risk. Similarly, respondents from the moderate to high group had significantly higher perceptions of wildfire risk to property, community and the natural environment than respondents in the low group. In terms of controllability of impacts, respondents in the high group had significantly lower perceptions of the controllability than respondents in the low group. The results also indicate that respondents in the moderate to high group have significantly higher levels of hazard anxiety. These results suggest that there are community group differences in risk perception indicators and that generally respondents in the moderate to high community level wildfire management group perceived the risk from wildfires to be higher and wildfires to be less controllable than respondents in the low group and exhibited

Table 15. *Risk Perception Indicators, by Community Wildfire Management Level*

	t-value	Low Community Level Wildfire Management *(n = 411)*	Moderate to High Community Level Wildfire Management *(n= 798)*
Hazard Risk Perception			
Wildfire	-8.36*	3.52 (1.62)	4.39 (1.76)
Hail	2.57*	4.06 (1.58)	2.81 (1.61)
Climate Change	-0.05	3.84 (1.87)	3.85 (1.86)
Drought	0.56	3.46 (1.74)	3.40 (1.69)
Tornadoes	4.37*	2.76 (1.64)	2.35 (1,49)
Mountain Pine Beetle	-7.80*	4.44 (2.07)	5.36 (1.85)
Flooding	11.33**	3.84 (2.17)	2.53 (1.73)
Wildfire Risk Perception			
Wildfire risk to property	-6.98*	3.21 (1.67)	3.95 (1.79)
Wildfire risk to community	-8.65*	4.05 (1.57)	4.85 (1.48)
Wildfire risk to environment	-3.75*	5.16 (1.64)	5.52 (1.55)
Controllability			
Controllability of wildfires impacts to property	2.60*	5.22 (1.65)	4.96 (1.56)
Controllability of wildfire impacts to community	2.34*	4.89 (1.49)	4.69 (1.42)
Controllability of wildfire impacts to environment	0.80	3.99 (1.72)	3.91 (1.63)
Acceptability			
Acceptability of wildfire impacts to property	0.70	2.12 (1.73)	2.05 (1.66)
Acceptability of wildfire impacts to community	-0.08	2.21 (1.60)	2.22 (1.67)
Acceptability of wildfire impacts to environment	-1.18	3.52 (2.11)	3.67 (2.04)
Likelihood a wildfire will occur in the next year	-5.10**	3.27 (1.24)	3.63 (1.13)
Hazard Anxiety	-1.96	4.00 (2.08)	4.24 (2.03)

* $p < 0.05$, ** $p < 0.0001$

greater anxiety over wildfires.

4.4 Wildfire Experience

Research has shown that experience with a hazard as well as knowledge of a hazard, in this case wildfires, can specifically influence risk perceptions (Beringer, 2000; Bushnell et al., 2006; Collins, 2005; Fried et al., 1999; Gardner et al., 1987; McCaffrey, 2008; McGee et al., 2005; McGee & Russell, 2003;

Ryan et al., 2006). To examine the influence of experience on perceptions of risk from wildfires, respondents were asked about their experiences with wildfires. Respondents were presented with a list of wildfire experiences and asked to indicate which applied to them (see Table 16). Direct experience with wildfires included feeling fear or anxiety because of a wildfire, experiencing discomfort or health problems from smoke from a wildfire, being evacuated or placed on evacuation alert because of a wildfire, having experience or training in fire management or as a firefighter, losing a house or other structure because of wildfire, seeing smoke or flames from a wildfire and indicating that a wildfire had come close to ones' community. Indirect experience included reading about or watching coverage of wildfires in the media and knowing someone who had lost their house because of a wildfire. Over 90 percent of respondents in all communities had indirect experience with wildfires (Table 16). This is to be expected given the high frequency and intensity of media coverage of wildfire events around the world, particularly when homes and properties are threatened.

While most respondents had indirect experience, direct experience with wildfires ranged from 58 to 90 percent of respondents. Over 84 percent of respondents in Grande Cache, Hinton and Whitecourt had direct experiences with wildfires while only 58-72 percent of Edson, High Level and Peace River respondents had direct experience. The chi-square test showed that a direct experience statistically differed by community. This difference between communities with low and moderate to high levels of community wildfire management is further seen in Table 17. Approximately 86 percent of respondents in the moderate to high group had direct experience with wildfires while 69 percent of respondents in the low group had direct experience. This result was statistically significant at the $p<0.0001$. These results indicate that wildfire experiences differ by community level wildfire management group.

Table 16. *Percent Wildfire Experience, by Community*

		Low Community Level Wildfire Management			Moderate to High Community Level Wildfire Management		
		Edson	High Level	Peace River	Grande Cache	Hinton	Whitecourt
	Chi-square values	*(n = 186)*	*(n = 57)*	*(n = 168)*	*(n= 120)*	*(n = 410)*	*(n = 268)*
Experience (Direct & Indirect)	χ^2 (5, 1209) = 8.3847, p = 0.1363	95.16	98.25	96.43	99.17	97.32	98.88
Read or watched coverage in the media	χ^2 (5, 1204) = 1.9051, p = 0.8621	94.02	92.98	95.18	96.67	93.89	94.78
Felt fear or anxiety	χ^2 (5, 1204) = 33.7478, p< 0.0001	36.41	21.05	28.31	50.00	44.01	48.51
Experienced discomfort or health problems from smoke	χ^2 (5, 1204) = 36.31, p< 0.0001	23.37	26.32	22.29	44.17	40.83	30.60
Placed on evacuation alert	χ^2 (5, 1204) = 154.120, p< 0.0001	15.76	5.26	6.02	25.00	11.49	44.78
Evacuated	χ^2 (5, 1204) = 10.1904, p = 0.0700	3.26	3.51	0.60	1.67	2.69	5.60
Experience or training in fire management or firefighting	χ^2 (5, 1204) = 9.0456, p = 0.1073	16.30	17.54	15.66	21.67	16.63	24.25
Lost house or other structures on property	χ^2 (5, 1204) = 2.1666, p = 0.8256	1.09	0.00	0.60	0.00	0.73	1.12
Someone close to me has lost their house	χ^2 (5, 1204) = 6.0950, p = 0.2971	5.43	5.26	6.63	0.83	5.38	4.10
Seen smoke or flames near house	χ^2 (5, 1204) = 19.9430, p= 0.0013	33.15	19.30	33.73	50.83	35.21	38.06
Close to my community	χ^2 (5, 1204) = 83.2149, p< 0.0001	44.02	31.58	45.18	71.67	60.64	74.63
No experience	χ^2 (5, 1203) = 45.5493, p< 0.0001	30.98	29.82	35.54	15.00	18.34	13.86
Direct Experience	χ^2 (5, 1209) = 62.7691, p< 0.0001	71.51	57.89	69.05	86.67	84.39	89.55
Indirect Experience	χ^2 (5, 1209) = 2.4313, p =0.7868	93.01	92.98	94.64	96.67	94.15	95.15

In every community, over 95 percent of the respondents reportedly had some direct or indirect experience with wildfires but specific experiences with wildfires varied. The majority of respondents in all communities had read or watched coverage of wildfires in the media (over 90 percent). Approximately a third to three-quarters of respondents in each community indicated that a wildfire had come close to their community. Fifty percent or less of respondents had seen smoke or flames near their house and had felt fear or anxiety due wildfires and 45 percent or less had experienced discomfort or health problems from smoke from a wildfire. Less than a quarter of respondents had been placed on evacuation alert and an even smaller percentage had been evacuated due to a wildfire. Very few, less than 2 percent, of respondents had lost their house or another structure on their property from a wildfires but a slightly higher proportion of respondents (under 7 percent) indicated that someone close to them had lost their house from a wildfire. Less than a quarter of respondents had experience or training in fire management or firefighting.

Of all the communities, Whitecourt had the greatest proportion of respondents who indicated that they had been placed on evacuation alert and evacuated due to a wildfire. This result may be indicative of the fact that the 2001 Chisholm wildfire and the 1998 Virginia Hills wildfire came very close to the town of Whitecourt. Grande Cache had the greatest proportion of respondents who indicated that they had experienced discomfort or health problems as a result of smoke from a wildfire as well as seen smoke or flames near their house. Grande Cache is situated very close to the Wilmore Wilderness Park and frequently is affected by smoke from prescribed burning in the park. Overall, considerably fewer respondents from the low community level wildfire management group had direct experience with wildfires. In fact, chi-square tests showed that several experiences differed across communities: fear or anxiety, discomfort or health

wildfire management levels.

4.5 Wildfire Knowledge

Along with wildfire experience, respondents' knowledge of wildfire facts was also assessed because knowledge of a hazard has been found to influence risk perceptions and adoption of mitigation measures (Table 18) (Beringer, 2000; Collins, 2005; Fried et al., 1999; Gardner et al., 1987; McCaffrey, 2008; McGee et al., 2005; McGee & Russell, 2003; Ryan et al., 2006). Knowledge was assessed using six true or false statements. A total knowledge score was calculated based on the number of correct answers. Overall respondents in all of the communities were very knowledgeable about wildfires with an average of 4 out of 6 questions answered correctly. Respondents in Grande Cache on average had the highest mean knowledge scores while respondents from Peace River had the lowest mean knowledge scores. An analysis of variance showed that mean knowledge scores were similar across all communities.

Overall the majority of respondents from each community answered each true or false statement correctly. Between 75 and 95 percent of respondents knew that flames are not the only cause of a house burning during a wildfire. Respondents were also very knowledgeable about the fact that wildfires can be an important force in controlling outbreaks of disease and insects in forests and that and that it does not take decades before plants grow in a fire damaged forest. The majority of respondents knew that wildfires burn faster going up hill and that wildfires help recycle minerals and nutrients needed by trees and other plants but respondents were least knowledgeable about the fact that wildfires do not usually result in the death of most animals in the burnt area. Overall, these results indicated that the majority of respondents were knowledgeable about wildfires but it is interesting to note that a high percentage of respondents (20-35 percent) in all

Table 17. *Percent Wildfire Experience, by Community Wildfire Management Level*

	Chi-square values	Low Community Level Wildfire Management *(n = 407)*	Moderate to High Community Level Wildfire Management *(n= 797)*
Experience (Direct & Indirect)	χ^2 (1, 1209) = 4.4011, p <0.05	96.11	98.12
Read or watched coverage in the media	χ^2 (1, 1204) = 0.0340, p = 0.8536	94.35	94.60
Felt fear or anxiety	χ^2 (1, 1204) = 26.6019, p< 0.0001	30.96	46.42
Experienced discomfort or health problems from smoke	χ^2 (1, 1204) = 25.8092, p< 0.0001	23.34	37.89
Placed on evacuation alert	χ^2 (1, 1204) = 35.1055, p< 0.0001	10.32	24.72
Evacuated	χ^2 (1, 1204) = 1.5330, p = 0.2157	2.21	3.51
Experience or training in fire management or firefighting	χ^2 (1, 1204) = 2.4715, p = 0.1159	16.22	19.95
Lost house or other structures on property	χ^2 (1, 1204) = 0.0009, p = 0.9761	0.74	0.75
Someone close to me has lost their house	χ^2 (1, 1204) = 1.5627, p = 0.2113	5.90	4.27
Seen smoke or flames near house	χ^2 (1, 1204) = 25.8092, p= 0.0157	31.45	38.52
Close to my community	χ^2 (1, 1204) = 65.3983, p< 0.0001	42.75	67.00
No experience	χ^2 (1, 1204) = 42.1248, p< 0.0001	32.68	16.33
Direct Experience	χ^2 (1, 1209) = 58.861, p< 0.0001	68.61	86.47
Indirect Experience	χ^2 (5, 1203) = 0.7316, p = 0.3923	93.67	94.86

problems from smoke, placed on evacuation alert, seen smoke or flames, close to community and no experience.

This result was further examined in Table 17, which presents experiences with wildfires by community wildfire management level. A statistically higher percentage of respondents in the low group had no experience with wildfires. As well, respondents from the low group had statistically fewer experiences than the moderate to high group in terms of feeling fear or anxiety, experiencing discomfort or health problems from smoke, being placed on evacuation alert, seeing smoke or flames near house and wildfires coming close to their community. These results further indicate that wildfire experiences differ by community

Table 18. *Wildfire Knowledge, by Community*

		Low Community Level Wildfire Management			Moderate to High Community Level Wildfire Management		
	ANOVA	Edson	High Level	Peace River	Grande Cache	Hinton	Whitecourt
	F-value	*(n = 186)*	*(n = 57)*	*(n = 168)*	*(n= 120)*	*(n = 410)*	*(n = 268)*
Knowledge score	1.83	4.27 (1.64)	4.34 (1.47)	4.09 (1.61)	4.57 (1.57)	4.46 (1.49)	4.39 (1.58)
Wildfires burn faster going up hill.[1]							
Mostly true		62.16	66.67	58.43	66.39	63.59	63.50
Mostly false		8.65	12.28	8.43	2.52	9.48	6.46
Not sure		29.19	21.05	33.13	31.09	26.93	30.04
Houses only burn when the flames from a wildfire reach the house.[2]							
Mostly true		9.84	1.79	13.41	8.33	13.12	10.23
Mostly false		79.78	94.64	75.00	83.33	77.97	81.82
Not sure		10.38	3.57	11.59	8.33	8.91	7.95
Wildfires can be an important force in controling outbreaks of disease and insects in forests.[3]							
Mostly true		83.78	78.57	79.39	85.71	87.10	83.52
Mostly false		7.03	12.50	9.09	5.88	4.71	6.37
Not sure		9.19	8.93	11.52	8.40	8.19	10.11
It takes decades before plants grow in a fire damaged forest.[4]							
Mostly true		22.95	22.81	21.21	12.61	16.26	17.23
Mostly false		74.32	73.68	73.94	79.83	79.56	76.40
Not sure		2.73	3.51	4.85	7.56	4.19	6.37
Wildfires usually result in the death of most animals in the burnt area.[5]							
Mostly true		24.46	32.73	28.66	20.00	22.58	23.60
Mostly false		57.61	56.36	54.88	65.83	61.54	57.30
Not sure		17.93	10.91	16.46	14.17	15.88	19.10
Wildfires help recycle minerals and nutrients needed by trees and other plants.[6]							
Mostly true		69.73	64.29	68.86	74.17	75.12	76.05
Mostly false		9.19	17.86	11.98	11.67	8.62	7.98
Not sure		21.08	17.86	19.16	14.17	16.26	15.97

[1] $\chi^2(10, 1191) = 11.8297, p = 0.2966$

[2] $\chi^2(10, 1191) = 14.3134, p = 0.1592$

[3] $\chi^2(10, 1191) = 9.7346, p = 0.4641$

[4] $\chi^2(10, 1197) = 13.0912, p = 0.2186$

[5] $\chi^2(10, 1193) = 9.2924, p = 0.5046$

[6] $\chi^2(10, 1197) = 11.4319, p = 0.3249$

Note: The correct response is indicated by bold text.

communities were not sure if wildfires burn faster going up hill.

Differences in wildfire knowledge by community wildfire management level were also examined (Table 19). The results indicate that respondents from the moderate to high community level wildfire management group were significantly more knowledgeable than respondents from the low group. As well, a significantly higher percentage of respondents in the high group correctly knew that it does not take decades before plants grow in a fire damaged forest and that wildfires help recycle minerals and nutrients needed by trees and other plants. The results suggest that knowledge of wildfires is differs by community wildfire management levels.

4.6 Wildfire Awareness

Table 20 presents an analysis of variance and means and percentages for indicators of wildfire awareness. Critical awareness, the extent to which people think and talk about wildfires, was measured on a scale of 1 (never), 2 (rarely), 3 (a few times a year), 4 (once a month) and 5 (once a week or more). On average, respondents from all communities think about wildfires a few times a year but talk about wildfires less frequently. Respondents from High Level had the highest mean level of thinking (3.07) and talking (3.04) about wildfires. Peace River respondents had the lowest mean level of thinking (2.69) and talking about wildfires (2.61). These results indicate a moderate level of critical awareness across all communities but differences between the communities in respondents' mean levels of thinking and talking were noted (at a $p<0.05$ level). Respondents from Peace River had statistically lower levels of thinking about wildfires than respondents from Hinton and Whitecourt, and lower levels of talking about wildfires than respondents from High Level, Hinton and Whitecourt. This result suggests that there is variation in the critical awareness of wildfires by community.

Respondents' wildfire awareness was also assessed by examining whether or not they had searched for information about wildfires, which suggests that respondents are informed and aware of the threat to themselves, their property or their community and

Table 19. *Wildfire Knowledge, by Community Wildfire Management Level*

	ANOVA *F-value*	Low Community Level Wildfire Management *(n = 411)*	Moderate to High Community Level Wildfire Management *(n= 798)*
Knowledge score	-2.51*	4.21 (1.60)	4.45 (1.53)
Wildfires burn faster going up hill.	χ^2 (1, 1191) = 1.3423, p = 0.5111		
Mostly true		61.27	63.98
Mostly false		9.07	7.41
Not sure		29.66	28.61
Houses only burn when the flames from a wildfire reach the house.	χ^2 (1, 1191) = 0.9794, p = 0.6128		
Mostly true		10.17	11.42
Mostly false		79.90	80.08
Not sure		9.93	8.50
Wildfires can be an important force in controlling outbreaks of disease and insects in forests.	χ^2 (1, 1195) = 5.1787, p = 0.0751		
Mostly true		81.28	85.68
Mostly false		8.62	5.45
Not sure		10.10	8.87
It takes decades before plants grow in a fire damaged forest.	χ^2 (1, 1197) = 7.9972, p = 0.0183		
Mostly true		22.22	16.04
Mostly false		74.07	78.54
Not sure		3.71	5.42
Wildfires usually result in the death of most animals in the burnt area.	χ^2 (1, 1193) = 3.4107, p = 0.1817		
Mostly true		27.30	22.53
Mostly false		56.33	60.76
Not sure		16.37	16.71
Wildfires help recycle minerals and nutrients needed by trees and other plants.	χ^2 (1, 1197) = 6.0742, p = 0.0480		
Mostly true		68.63	75.29
Mostly false		11.52	8.87
Not sure		19.85	15.84

* t-value, significant at $p < 0.05$

Table 20. *Wildfire Awareness, by Community*

		Low Community Level Wildfire Management			Moderate to High Community Level Wildfire Management		
	ANOVA	Edson	High Level	Peace River	Grande Cache	Hinton	Whitecourt
	F-value	*(n = 186)*	*(n = 57)*	*(n = 168)*	*(n= 120)*	*(n = 410)*	*(n = 268)*
Critical Awareness							
Think about wildfires	3.49*	2.86 (1.05)ab	3.07 (1.18)ab	2.69 (0.91)a	3.02 (1.01)ab	2.95 (0.92)b	3.06 (0.95)b
Talk about wildfires	3.67*	2.74 (0.95)ab	3.04 (1.17)b	2.61 (0.87)a	2.89 (0.98)ab	2.86 (0.89)b	2.93 (0.96)b
Searched for wildfire information[1]							
Yes		18.38	20.00	7.78	24.37	21.92	23.13
No		81.62	80.00	92.22	75.63	78.08	76.87
Heard of FireSmart[2]							
Yes		63.78	54.55	47.90	71.19	79.61	57.84
No		36.22	45.45	52.10	28.81	20.39	42.16

Note: The F statistic is computed from a one-way analysis of variance and letters indicate Tukey's results

* $p < 0.05$

[1] $\chi^2(5, 1200) = 19.99, p = 0.0013$

[2] $\chi^2(5, 1200) = 70.8583, p < 0.0001$

Table 20 continued. *Wildfire Awareness, by Community*

	Low Community Level Wildfire Management			Moderate to High Community Level Wildfire Management		
	Edson *(n = 186)*	High Level *(n = 57)*	Peace River *(n = 168)*	Grande Cache *(n= 120)*	Hinton *(n = 410)*	Whitecourt *(n = 268)*
Hazard Home and Site Assessment completed[1]						
Yes	2.75	5.26	0.62	5.08	3.23	5.88
No	80.77	80.70	90.06	78.81	85.36	81.18
Not sure	16.48	14.04	9.32	16.10	11.41	12.94
If a Hazard Home and Site Assessment was done, were the suggestions completed?[2]						
Yes	100.00	100.00	100.00	83.33	92.31	100.00
No	0.00	0.00	0.00	16.67	7.69	0.00
Aware of any wildfire management activity occuring around the community?[3]						
Yes	19.57	23.21	12.20	84.17	69.63	26.62
No	23.91	33.93	30.49	2.50	7.65	13.69
Not sure	53.52	42.86	57.32	13.33	22.72	59.70

[1] $\chi^2(10, 1176) = 16.0000, p = 0.0997$

[2] $\chi^2(5, 37) = 2.6496, p = 0.7538$

[3] $\chi^2(10, 1192) = 366.15, p < 0.0001$

indicates that a respondent takes action to learn about perceived risks. Fewer than 25 percent of respondents in all communities had searched for any information on wildfires. Grande Cache had the greatest proportion of respondents who had searched for information (24.37%) and Peace River the lowest (7.78%). It was also determined that there were statistical differences between communities, most likely because of the very low percentage of respondents from Peace River who had searched for information.

Respondents were also asked if they had heard the term 'FireSmart'. FireSmart is a program that has been adopted by the Alberta government and promoted in several of the study communities (particularly Grande Cache and Hinton). Over 50 percent of respondents in Edson (63.78%), High Level (54.55%), Grande Cache (71.19%), Hinton (79.61%) and Whitecourt

(57.84%) indicated that they had heard of FireSmart, while just under half of the respondents from Peace River (47.90%) had. Almost 80 percent of the respondents from Hinton had heard of FireSmart. These results suggest that the promotion of FireSmart has been fairly effective, particularly in Hinton, but it may be that people have just heard of the term 'FireSmart'.

The completion of a wildfire hazard assessment on a respondents' property indicates respondents' awareness of wildfire mitigation measures and the threat to their property from potential wildfires. Respondents were asked if a wildfire hazard home and site assessment had been completed on their properties and if so, was it completed by them, the local fire department, private contractor or the provincial government (Table 20). Very few of the respondents in each community (under 6 percent) have had a hazard home and site assessment completed. Of those who had an assessment completed, over 80 percent reported that they have completed some or all of the suggestions made during the assessment. This finding suggests that wildfire hazard assessments are effective at encouraging the adoption of wildfire mitigation activities.

Awareness of wildfire management activities occurring around the communities was also assessed (Table 20). At the time of this study, the communities of Edson, High Level and Peace River had not completed wildfire management activities, such as prescribed burning, thinning or the creation of fireguards, and the majority of respondents from these communities were unsure if any of these activities were done around their communities. In the communities where a high amount of wildfire management activities had occurred (Grande Cache, Hinton), the majority of respondents knew that these activities had occurred. These results suggest that for the most part respondents are aware of wildfire management actions around their communities. Interestingly, a moderate amount of wildfire management has been completed in Whitecourt

but the majority of respondents there were unsure if these activities were done around their communities. This could be a result of the lack of promotion of these activities as wildfire management measures.

Statistical differences in Table 20 were further examined and the results presented in Table 21, which presents the wildfire awareness indicators by community level wildfire management group. Respondents from the moderate to high group thought about and talked about wildfire significantly more than respondents in the low group. Similarly, a significantly higher proportion of respondents in the moderate to high group had searched for wildfire information, heard of FireSmart and were aware of wildfire management activities occurring around their community. These results further suggest that awareness differs by community.

4.7 Psychological and Social Characteristics

Psychological and social characteristics of respondents were assessed to determine if there was a relationship between these indicators and adoption of wildfire mitigation measures (Table 22). Outcome expectancy, the perception of whether personal action will actually mitigate the risk wildfires, was measured using two statements: (1) "Preparing for wildfires will significantly reduce damage to my house should a wildfire occur" and (2) "Wildfires are too destructive to bother preparing for". Respondents indicated their agreement on a scale of 1 (strongly disagree) to 5 (strongly agree). Across all communities, respondents generally had moderate levels of agreement that preparing for wildfires will reduce damage (M>3.00) and low levels of agreement that wildfires are too destructive to bother preparing for (M<2.50). Hinton respondents had the highest level of agreement that preparing for wildfires will significantly reduce damage to their house in the event of a wildfire. Respondents from High Level

Table 21. *Wildfire Awareness, by Community Wildfire Management Level*

	t-value	Low Community Level Wildfire Management *(n = 411)*	Moderate to High Community Level Wildfire Management *(n= 798)*
Critical Awareness			
Think about wildfires	-3.01*	2.72 (0.95)	2.82 (0.90)
Talk about wildfires	-2.84*	2.63 (0.90)	2.82 (0.88)
Searched for wildfire information[1]			
Yes		14.25	22.70
No		85.75	77.30
Heard of FireSmart[2]			
Yes		56.02	71.00
No		43.98	29.00
Hazard Home and Site Assessment completed[3]			
Yes		2.25	4.38
No		84.50	82.99
Not sure		13.25	12.63
If a Hazard Home and Site Assessment was done, were the suggestions completed?[4]			
Yes		100.00	6.90
No		0.00	93.10
Aware of any wildfire management activity occuring around the community?[5]			
Yes		17.08	57.49
No		27.97	8.88
Not sure		54.95	33.63

* $p < 0.05$

[1] $\chi^2(1, 1200) = 12.0727, p = 0.0005$

[2] $\chi^2(1, 1200) = 26.8518, p < 0.0001$

[3] $\chi^2(2, 1176) = 3.4309, p = 0.1799$

[4] $\chi^2(1, 37) = 0.5833, p = 0.4450$

[5] $\chi^2(2, 1192) = 192.6742, p < 0.0001$

had the highest mean agreement that wildfires are too destructive to bother preparing for. Respondents from Peace River had the lowest mean agreement, indicating a belief that the impacts of wildfire can be mitigated by preparing beforehand. No significant differences were observed among the communities on these two variables indicating that respondents from all communities had similar

levels of agreement with both statements. These results suggest that respondents generally believe it is possible to mitigate the impacts of wildfires.

Similar to outcome expectancy, self-efficacy, the belief in one's own ability to succeed at a task, was measured on a scale of 1 (strongly disagree) to 5 (strongly agree). Respondents indicated their level of agreement with having considerable control over their life and solving most of their problems by themselves. Across all communities, respondents indicated that they had high levels of control over their life and solved most of their problems by themselves. Respondents from High Level indicated that they had the highest mean control over life (4.27) while respondents from Hinton appeared to have the lowest mean control over their life (4.10). Respondents from Grande Cache had the highest mean level of agreement for solving most problems by themselves (4.17), with the lowest level of agreement from Peace River respondents (4.01). The mean range for both variables was very small and ANOVA results showed that respondents from all communities had similar levels of agreements for both statements.

Problem-focused coping is the tendency to use actions that aim to change a situation. On a scale of 1 (strongly disagree) to 5 (strongly agree), problem-focused coping was measured by asking respondents' level of agreement with the statements (1) "I try to come up with a strategy about what to do", (2) "I think about how I might best handle the problem" and (3) "I sometimes feel helpless when dealing with problems". Respondents from all communities appeared to have high levels of problem focused coping. High Level respondents had the highest mean level of agreement with 'coming up with a strategy' (4.45). Both Peace River and Grande Cache had the highest mean level of agreement (4.36) with 'thinking about how to best handle a problem'. For 'sometimes feeling helpless when dealing with problems', respondents from High Level had the highest mean level of agreement (2.61). Again respondents from each community

Table 22. *Psychological and Social Characteristics, by Community*

		Low Community Level Wildfire Management			Moderate to High Community Level Wildfire Management		
	ANOVA	Edson	High Level	Peace River	Grande Cache	Hinton	Whitecourt
	F-value	*(n = 186)*	*(n = 57)*	*(n = 168)*	*(n= 120)*	*(n = 410)*	*(n = 268)*
Outcome Expectancy							
Preparing for wildfires will reduce damage to my house	0.77	3.84 (1.13)	3.54 (1.05)	3.69 (1.12)	3.75 (1.11)	3.78 (1.13)	3.77 (1.08)
Too destructive to bother preparing	1.00	2.18 (1.18)	2.44 (1.48)	2.12 (1.11)	2.17 (1.32)	2.13 (1.19)	2.27 (1.26)
Self-efficacy							
Considerable control over life	1.32	4.15 (0.91)	4.27 (0.92)	4.25 (0.76)	4.25 (0.83)	4.10 (0.84)	4.15 (0.75)
Solve most of my problems myself	0.63	4.09 (0.85)	4.05 (1.10)	4.01 (0.81)	4.17 (0.84)	4.05 (0.78)	4.08 (0.73)
Problem-focused coping							
Come up with a strategy	1.96	4.22 (0.68)	4.45 (0.60)	4.25 (0.59)	4.31 (0.58)	4.22 (0.60)	4.21 (0.56)
Think about how best to handle problem	1.32	4.27 (0.66)	4.33 (0.64)	4.36 (0.61)	4.36 (0.58)	4.29 (0.58)	4.24 (0.56)
Sometimes feel helpless	0.59	2.47 (1.14)	2.61 (1.23)	2.36 (1.08)	2.41 (1.14)	2.44 (1.06)	2.39 (1.02)
Perceived responsibility							
Myself and household	1.99	4.25 (0.73)	3.88 (0.96)	4.21 (0.76)	4.18 (0.91)	4.17 (0.85)	4.18 (0.75)
Local fire department	0.26	4.13 (0.94)	4.12 (0.78)	4.08 (0.96)	4.13 (0.98)	4.05 (0.96)	4.11 (0.84)
Municpal government	1.68	4.31 (0.86)	4.09 (0.71)	4.25 (0.82)	4.40 (0.87)	4.26 (0.82)	4.19 (0.83)
Provincial government	1.70	4.29 (0.96)	4.26 (0.64)	4.22 (0.86)	4.41 (0.82)	4.25 (0.86)	4.14 (0.93)
Federal government	1.37	3.99 (1.14)	3.84 (1.07)	3.90 (1.11)	4.20 (1.04)	3.99 (1.11)	3.94 (1.04)
Sense of Community							
Often interact with others	1.34	3.91 (0.99)	4.02 (0.80)	4.02 (0.83)	4.00 (0.83)	4.01 (0.86)	3.86 (0.88)
Feel like I belong in this town	1.50	3.97 (0.99)	4.09 (0.82)	4.11 (0.78)	4.15 (0.81)	4.09 (0.86)	3.97 (0.86)
I would not move away	6.87***	3.02 (1.32)bc	2.95 (1.08)b	3.27 (1.11)ab	3.64 (1.23)a	3.31 (1.21)ac	2.99 (1.18)b

Note: The F statistic is computed from a one-way analysis of variance and letters indicate Tukey's results

*** $p < 0.0001$

had similar levels of agreement with the problem focused coping statements.

To assess perceived responsibility for wildfire risk reduction on their own house and property, respondents indicated their attribution of responsibility for mitigating wildfire impacts to either themselves and their household, the local fire department, the municipal government, provincial government and federal government on a scale of 1 (strongly disagree) to 5 (strongly agree). Respondents perceived all as having some responsibility for mitigating wildfire impacts (M>3.0) and attributed moderate to high levels of responsibility to themselves (M>3.88). The attribution of responsibility was very similar between communities with the municipal and provincial governments considered to have the most responsibility for reducing the risk from wildfires to respondents' properties and the federal government to be the least responsible. Fairly high levels of responsibility were attributed to the local fire department (M>4.05). Respondents from Edson, Peace River, Grande Cache, Hinton and Whitecourt, attributed the highest mean responsibility to municipal government while High Level respondents attributed the highest mean responsibility to the provincial government. ANOVA results showed that there were no significant differences between communities and suggesting perceived responsibility for reducing the wildfire risk on ones' property does not differ by community.

Sense of community, the attachment to people or place, was also measured using statements: (1) "I often interact with other members of my community", (2) "I feel like I belong in this town", and (3) "Even if I had the opportunity I would not move out of this town". On a scale of 1 (strongly disagree) to 5 (strongly agree) respondents indicated their level of agreement with each statement. Overall respondents appeared to have a strong sense of community, indicating that they often interact with members of their community (M>3.75) and feel like they belong in their town (M>3.90). There was a lower level of agreement with not

moving away from their town (M<3.5). Grande Cache respondents indicated that they would be least likely to move away from their town while respondents from High Level were the most likely. At a p<0.0001 level, respondents from High Level were significantly more likely to indicate that they would move away from their town than respondents from Grande Cache, Edson, Hinton and Whitecourt. This result suggests that moving away from a community is the only sense of community indicator that differs by community.

Mean differences in psychological and social indicators between community level wildfire management groups were also examined (Table 23). The results show that there are no significant differences. Psychological and social indicators do not differ by community wildfire management levels. This result is to be expected as psychological and social characteristics are determined by individual or personal factors, such as socialization.

4.8 Response Efficacy

Response efficacy is a measure of people's perception of the available resources required to adopt wildfire mitigation measures and the degree of accordance between the perception of resources and the resources required to implement the wildfire mitigation measures. Available resources include information, social approval, cost, time (priority), physical abilities, and skills. Personal feelings include one's connection to nature and personal feelings about the threat from wildfires. Response efficacy was measured using eight statements: (1) "I need more information before I can complete some of these activities," (2) If I made all or some of these changes my family or neighbours would like it," (3) It would be difficult to find the money to make some of these changes to my property," (4) "Implementing these activities is a priority for me," (5) For physical reasons, I am unable to complete some of the activities without assistance," (6)

"I do not have the skills to complete some of the recommended activities," (7) "If I made these changes I would not feel as connected to nature," (8) "I do not consider the threat of wildfire significant enough to warrant doing some of the activities." Respondents indicated their agreement with the statements on a scale of 1 (strongly disagree) to 5 (strongly agree).

Table 24 presents an analysis of variance and means comparison for response efficacy. The mean levels of agreement with the availability of each of the resources show that some resources are more significant at influencing adoption of wildfire mitigation measures than others. Social approval, whether or not family, friends or neighbours approve of the mitigation activities, and cost of mitigation had mean levels greater than 3.50, for all communities while not

Table 23. *Psychological and Social Characteristics, by Community Wildfire Management Level*

	t-value	Low Community Level Wildfire Management *(n = 411)*	Moderate to High Community Level Wildfire Management *(n= 798)*
Outcome Expectancy			
Preparing for wildfires will reduce damage to my house	-0.54	3.73 (1.12)	3.77 (1.11)
Too destructive to bother preparing	0.15	2.19 (1.20)	2.18 (1.23)
Self-efficacy			
Considerable control over life	1.39	4.21 (0.85)	4.14 (0.81)
Solve most of my problems myself	-0.54	4.05 (0.87)	4.08 (0.78)
Problem-focused coping			
Come up with a strategy	0.78	4.26 (0.64)	4.23 (0.58)
Think about how best to handle problem	0.86	4.32 (0.63)	4.28 (0.58)
Sometimes feel helpless	0.37	2.44 (1.13)	2.42 (1.06)
Perceived responsibility			
Myself and household	1.09	4.18 (0.79)	4.18 (0.82)
Local fire department	1.00	4.11 (0.92)	4.08 (0.92)
Municpal government	1.07	4.25 (0.82)	4.26 (0.85)
Provincial government	1.06	4.26 (0.88)	4.23 (0.90)
Federal government	1.09	3.94 (1.12)	4.00 (1.07)
Sense of Community			
Often interact with others	0.27	3.97 (0.90)	3.96 (0.87)
Feel like I belong in this town	-0.28	4.04 (0.89)	4.06 (0.85)
I would not move away	-1.94	3.11 (1.21)	3.25 (1.22)

having enough information (M>3.0), mitigation not being a priority (M>3.0), not having the physical ability to complete the activities (M<3.0), and not perceiving the threat to be significant (M>3.0), had lower mean levels of agreement. Respondents also indicated lower mean agreement with not having the skills to complete the mitigation activities and not feeling a connection to nature if they completed the mitigation activities (M<3.0). In fact, connection to nature was the factor considered to be the least influential at constraining respondent's adoption of mitigation measures, across all communities. The greatest constraints on adoption of wildfire mitigation measures, across all communities, were: family and friends not approving of the mitigation activities, the cost of mitigation, not having enough information, the perception that the threat from wildfires is significant enough to adopt mitigation activities and not having enough time or implementing the activities not being a priority.

Except for the variable 'threat not significant', respondents in all communities had similar levels of agreement for each of the resources. In terms of respondents' personal feelings that the threat from wildfires is not significant

Table 24. *Response Efficacy Indicators, by Community*

		Low Community Level Wildfire Management			Moderate to High Community Level Wildfire Management		
	ANOVA	Edson	High Level	Peace River	Grande Cache	Hinton	Whitecourt
	F-value	*(n = 186)*	*(n = 57)*	*(n = 168)*	*(n= 120)*	*(n = 410)*	*(n = 268)*
Response Efficacy							
Information	0.92	3.43 (1.49)	3.14 (1.46)	3.23 (1.23)	3.23 (1.37)	3.20 (1.36)	3.33 (1.37)
Social approval	1.01	3.93 (1.29)	3.58 (1.29)	3.77 (1.25)	3.80 (1.23)	3.71 (1.21)	3.77 (1.33)
Cost	1.08	3.71 (1.32)	3.68 (1.35)	3.67 (1.24)	3.86 (1.28)	3.60 (1.24)	3.58 (1.28)
Time priority	0.81	3.26 (1.24)	2.98 (0.99)	3.09 (1.12)	3.24 (1.12)	3.18 (1.18)	3.13 (1.13)
Physical issues	1.98	2.70 (1.65)	2.60 (1.66)	2.73 (1.60)	3.12 (1.62)	2.73 (1.55)	2.58 (1.59)
Skills	0.72	3.02 (1.53)	2.65 (1.38)	2.98 (1.50)	3.00 (1.51)	2.96 (1.47)	2.87 (1.44)
Connection to Nature	0.55	2.55 (1.54)	2.33 (1.38)	2.51 (1.51)	2.69 (1.65)	2.50 (1.49)	2.48 (1.47)
Threat not significant	4.48**	3.38 (1.34)a	3.47 (1.21)a	3.34 (1.22)a	2.80 (1.39)b	3.16 (1.33)ab	3.07 (1.21)ab

Note: The F statistic is computed from a one-way analysis of variance and letters indicate Tukey's results

** p <0.001

enough to warrant adoption of mitigation measures, respondents from Grande Cache had a significantly lower level of agreement than respondents from Edson, High Level and Peace River ($p<0.001$).

These results were further supported when response efficacy indicators were compared by community level wildfire management groups (Table 25). Social approval, cost, lack of information and the significance of the threat were again the greatest constraints on respondents' abilities to adopt wildfire mitigation measures while connection to nature was the least influential factor. No significant differences were observed except for the threat not significant variable. Respondents from the moderate to high community level wildfire management group had statistically lower perceptions that the 'threat from wildfires is not significant enough to warrant mitigation' than respondents from the low community level wildfire management group.

4.9 Wildfire Risk Reduction Policy Preferences

To examine support for wildfire risk reduction, respondents were presented with seven risk reduction policies. Table 26 presents ANOVA and means comparison of wildfire risk reduction policy preferences (educating homeowners, bylaws requiring homeowners to remove shrubs trees and dead branches close to homes, reduced insurance premiums if recommended activities are completed, neighbourhood work bees, free wildfire hazard assessments, bylaws requiring new houses to use fire retardant building materials and restricting houses from building built in high risk areas). Support for wildfire risk reduction measures were measured on a scale of 1 (strongly oppose) to 5 (strongly favour). Overall, respondents supported all of the measures but indicated higher levels of support for certain measures over others.

The measures that received the highest mean levels of support were

Table 25. *Response Efficacy Indicators, by Community Wildfire Management Level*

	t-value	Low Community Level Wildfire Management *(n = 411)*	Moderate to High Community Level Wildfire Management *(n= 798)*
Response Efficacy			
Information	0.70	3.31 (1.39)	3.25 (1.27)
Social approval	0.85	3.81 (1.27)	3.75 (1.25)
Cost	0.79	3.69 (1.29)	3.63 (1.26)
Time priority	-0.30	3.15 (1.16)	3.17 (1.16)
Physical issues	-0.43	2.70 (1.62)	2.74 (1.58)
Skills	0.40	2.95 (1.50)	2.94 (1.46)
Connection to Nature	-0.20	2.50 (1.51)	2.52 (1.51)
Threat not significant	3.81*	3.38 (1.27)	3.08 (1.31)

* $p < 0.05$

educating homeowners on ways to reduce the wildfire risk on their properties (M>4.33), reducing insurance premiums if recommended activities are done (M>4.33), and free wildfire hazard assessments for residential properties (M>4.02). Restricting houses from being built in high risk areas (M<3.93) and bylaws requiring new houses to use fire retardant building materials received a moderate level of support (M<3.93). The least popular measures were neighbourhood work bees to help people prepare homes and properties for wildfires (M<3.75), and bylaws requiring homeowners to remove shrubs, trees and dead branches close to their house (M<3.75). An ANOVA found none of the mean levels of support were statistically significant and therefore respondents' level of support for wildfire risk reduction measures did not differ by community. Preferences for risk reduction measures were also assessed by community level wildfire management group and similar results were found (Table 27). Except for restricting houses from being built in high risk areas there were no observed significant differences between groups; the moderate to high group had a very small, yet statistically significant, lower level of support for restricting houses from being built in high risk areas. Overall though, preferences for wildfire risk reduction measures did not differ by community wildfire management levels.

Table 26. *Preferences for Wildfire Risk Reduction Policy, by Community*

		Low Community Level Wildfire Management			Moderate to High Community Level Wildfire Management		
	ANOVA	Edson	High Level	Peace River	Grande Cache	Hinton	Whitecourt
	F-value	*(n = 186)*	*(n = 57)*	*(n = 168)*	*(n= 120)*	*(n = 410)*	*(n = 268)*
Educate homeowners about ways to reduce wildfire risk on their properties	0.78	4.51 (0.79)	4.33 (0.86)	4.53 (0.65)	4.51 (0.72)	4.51 (0.66)	4.49 (0.68)
Bylaws requiring homeowners to remove shrubs, trees and dead branches close to their house	0.62	3.73 (1.32)	3.44 (1.29)	3.62 (1.28)	3.73 (1.35)	3.62 (1.19)	3.66 (1.22)
Reduced insurance premiums if recommended ativities are done	0.11	4.38 (0.97)	4.33 (0.84)	4.40 (0.90)	4.38 (0.96)	4.35 (0.92)	4.36 (0.87)
Neighbourhood work bees to help people to prepare homes and properties for wildfires	1.81	3.52 (1.16)	3.40 (1.05)	3.74 (0.99)	3.68 (1.20)	3.64 (1.07)	3.50 (1.03)
Free wildfire hazard assessments for residential properties	1.99	4.23 (1.02)	4.02 (0.89)	4.41 (0.79)	4.34 (0.91)	4.29 (0.83)	4.25 (0.83)
Bylaws requiring new houses to use fire retardant building materials	0.85	4.11 (1.15)	3.96 (1.05)	4.25 (1.04)	4.20 (1.15)	4.17 (1.06)	4.11 (1.09)
Restrict houses from being built in high risk areas	1.68	3.70 (1.36)	3.60 (1.30)	3.92 (1.28)	3.68 (1.36)	3.61 (1.32)	3.58 (1.33)

Note: The F statistic is computed from a one-way analysis of variance and letters indicate Tukey's results

4.10 Preferences for Wildfire Suppression and Fuel Management and Perceived Effectiveness

4.10.1 Wildfire Suppression Preferences

Wildfire suppression preferences were measured on a scale of 1 (strongly oppose) to 5 (strongly favour) with respondents indicating their support for four wildfire suppression options (Table 28). All of the measures received moderate to low levels of support (M<3.5). Respondents indicated greater support for suppression of wildfires than letting wildfires burn out naturally. Respondents from Edson, High Level, Hinton and Whitecourt, indicated the highest level of support for suppressing wildfires as soon as they started, no matter the cost. Respondents from Peace River and Grande Cache were supportive of letting wildfires burn as long as human safety and public and private structures are not in danger. Fighting wildfires if they were likely to be very intense, spread very quickly or if the fire is likely to burn large areas of land were somewhat supported suppression options (M<3.5) across all communities except for Whitecourt. Respondents from Whitecourt and Grande Cache showed strong preferences for

Table 27. *Preferences for Wildfire Risk Reduction Policy, by Community Wildfire Management Levels*

	t-value	Low Community Level Wildfire Management *(n = 411)*	Moderate to High Community Level Wildfire Management *(n= 798)*
Educate homeowners about ways to reduce wildfire risk on their properties	-0.20	4.49 (0.75)	4.50 (0.68)
Bylaws requiring homeowners to remove shrubs, trees and dead branches close to their house	-0.04	3.65 (1.30)	3.65 (1.22)
Reduced insurance premiums if recommended activities are done	0.44	4.38 (0.92)	4.35 (0.91)
Neighbourhood work bees to help people to prepare homes and properties for wildfires	-0.10	3.59 (1.09)	3.60 (1.08)
Free wildfire hazard assessments for residential properties	-0.10	4.27 (0.92)	4.28 (0.84)
Bylaws requiring new houses to use fire retardant building materials	-0.10	4.15 (1.10)	4.15 (1.09)
Restrict houses from being built in high risk areas	2.09*	3.78 (1.32)	3.61 (1.33)

* p <0.05

different wildfire suppression options, with Whitecourt respondents preferring immediate suppression and Grande Cache respondents preferring to let wildfires burn. The mean differences suggest that wildfire suppression preferences differ across communities.

Statistically significant differences between respondents in communities were observed. At a $p<0.001$ level, respondents from Whitecourt had significantly lower levels of support for letting wildfires burn unless human safety and public and private structures were in danger than respondents from Edson, Peace River and Grande Cache. Respondents from Grande Cache had statistically higher levels of support for this option compared to respondents from Hinton and Whitecourt. At the $p<0.05$ level, respondents from Whitecourt indicated a significantly higher level of support for fighting wildfires as soon as they start, no matter what the cost, than Edson, Peace River and Grande Cache respondents.

4.10.2 Wildfire Fuel Management Preferences

Wildfire risk reduction measures are actions taken by a community to reduce the risk from wildfires. Community level wildfire management measures include fuel treatments to reduce the potential impacts of wildfires. Preferences for fuel treatments around the respondent's community were measured on a scale of 1 (strongly oppose) to 5 (strongly favour) (Table 29). Overall, for all communities, all of the management measures were highly supported ($M>3.75$) but fireguards received the highest level of support. Prescribed burning received the second highest level of support from respondents in Edson, High Level, Peace River and Whitecourt while respondents from Grande Cache and Hinton indicated that thinning is the second highest supported wildfire management measure.

At the $p<0.0001$ level, the mean level of support for fireguards statistically differed by community. Respondents from Whitecourt had a statistically lower level of support for fireguards than respondents from High Level, Grande Cache

Table 28. *Preferences for Wildfire Suppression, by Community*

	ANOVA	Low Community Level Wildfire Management			Moderate to High Community Level Wildfire Management		
	F-value	Edson *(n = 186)*	High Level *(n = 57)*	Peace River *(n = 168)*	Grande Cache *(n= 120)*	Hinton *(n = 410)*	Whitecourt *(n = 268)*
Wildfire suppression							
Let burn unless human safety and public and private structures are in danger	4.82**	3.16 (1.48)ab	3.04 (1.49)abc	3.16 (1.47)ab	3.43 (1.38)a	2.98 (1.34)bc	2.74 (1.38)c
Fight if the fire is likely to be very intense and spread very quickly	1.36	2.98 (1.53)	3.09 (1.50)	2.96 (1.56)	3.36 (1.55)	3.11 (1.47)	2.99 (1.53)
Fight if the fire is likely to burn large areas of land	0.93	2.84 (1.53)	3.20 (1.48)	2.74 (1.43)	2.94 (1.57)	2.86 (1.43)	2.83 (1.45)
Wildfires should be fought as soon as they start, no matter the cost	3.32*	3.28 (1.53)ab	3.21 (1.52)ab	2.99 (1.56)b	2.97 (1.54)b	3.15 (1.43)ab	3.48 (1.41)a

Note: The F statistic is computed from a one-way analysis of variance and letters indicate Tukey's results

*** $p < 0.0001$, ** $p < 0.001$, * $p < 0.05$

and Hinton. Peace River respondents also had a significantly lower level of support for fireguards than respondents from Grande Cache and Hinton. Despite these significant differences, fireguards were still the most supported by all communities.

The mean level of support for thinning, at a $p<0.05$ level, is also statistically significant. Peace River respondents had a statistically significant lower level of support for thinning than Grande Cache and Hinton respondents. At a $p<0.001$ level, Hinton respondents have a significantly lower level of support for prescribed burning than respondents from all of the other communities. These results indicate that support for community level wildfire management measures varied between communities.

4.10.3 Perceived Effectiveness of Wildfire Fuel Management

Respondents' perceived effectiveness of each fuel treatment measure in protecting their community is shown in Table 29. Effectiveness of wildfire fuel management was measured on a scale of 1 (very ineffective) to 5 (very effective). Respondents from all communities perceived all the measures to be moderately effective ($M>3.0$). Fireguards were perceived to be the most effective for all the communities, except Grande Cache. Grande Cache respondents indicated that prescribed burning was the most effective measure. Overall, thinning was perceived as the least effective measure by all respondents.

An ANOVA showed that the mean level of perceived effectiveness of thinning was statistically different at a $p<0.0001$ level. Respondents from Peace River and Whitecourt had a significant lower perception of thinning as an effective wildfire fuel management tool than respondents from Edson, Grande Cache, and Hinton. At the $p<0.001$ level, respondents from Hinton perceived prescribed burning to be statistically less effective than respondents from Grande Cache. These results indicate that vegetation thinning was not perceived to be an

Table 29. *Preferences for Wildfire Fuel Management and Perceived Effectiveness, by Community*

		Low Community Level Wildfire Management			Moderate to High Community Level Wildfire Management		
	ANOVA	Edson	High Level	Peace River	Grande Cache	Hinton	Whitecourt
	F-value	*(n = 186)*	*(n = 57)*	*(n = 168)*	*(n= 120)*	*(n = 410)*	*(n = 268)*
Preference							
Fireguards	7.38***	4.18 (1.08)ac	4.50 (0.79)bc	4.05 (1.13)ab	4.49 (0.92)c	4.33 (0.94)c	3.98 (1.08)a
Thinning	3.12*	3.99 (1.09)ab	4.11 (1.00)ab	3.77 (1.15)a	4.15 (1.04)b	4.09 (0.98)b	3.91 (1.10)ab
Prescribed burning	6.13***	4.05 (1.02)a	4.30 (1.06)a	4.01 (0.98)a	4.03 (1.14)a	3.69 (1.19)b	3.97 (1.01)a
Effectiveness							
Fireguards	1.74	3.96 (1.05)	4.21 (0.89)	3.85 (1.04)	3.91 (1.02)	3.91 (0.95)	3.82 (0.96)
Thinning	6.00***	3.68 (1.17)ac	3.67 (1.26)ab	3.30 (1.15)b	3.75 (1.13)ac	3.79 (0.98)a	3.48 (1.15)b
Prescribed burning	4.35**	3.84 (1.05)ab	4.02 (1.08)ab	3.63 (1.02)ab	3.98 (1.05)a	3.59 (1.07)b	3.68 (1.05)ab

Note: The F statistic is computed from a one-way analysis of variance and letters indicate Tukey's results

*** $p < 0.0001$, ** $p < 0.001$, * $p < 0.05$

effective management measure and preferences and perceptions of effectiveness of community level wildfire management measures vary by community.

The result that preferences for wildfire suppression (Table 30), and fuel management measures (Table 31) as well as the perceived effectiveness (Table 31) of these measures differs by community, was further examined to determine if these differences were observed between community level wildfire management groups. Similar results were found in terms of preferences and support but there were not as many significant differences. Respondents in the low group had significantly higher support for letting wildfires burn unless human safety and public and private structures are in danger and for prescribed burning than respondents in the moderate to high group, which may be because of the negative impact of the prescribed burning that has occurred around these communities. Respondents in the moderate to high group felt that thinning was statistically more effective than respondents in the low group. These results further confirm that preferences for wildfire suppression and wildfire management measures as well as the perceived effectiveness of these measures vary by community.

4.11 Chapter Summary

This chapter aimed to address two of the study research objectives. The first research objective, to examine WUI residential property owner's motivation, intention and adoption of wildfire mitigation measures, including, risk perceptions, demographics, knowledge, experience, wildfire awareness and other social and psychological characteristics as well as differences among communities with lower and higher levels of community level wildfire management, was addressed with the presentation of the descriptive statistics for intention and adoption of wildfire mitigation measures, risk perception, demographics, experience, knowledge, wildfire awareness, psychological and

Table 30. *Preferences for Wildfire Suppression , by Community Wildfire Management Level*

	t-value	Low Community Level Wildfire Management *(n = 411)*	Moderate to High Community Level Wildfire Management *(n= 798)*
Let burn unless human safety and public and private structures are in danger	2.00*	3.14 (1.47)	2.97 (1.38)
Fight if the fire is likely to be very intense and spread very quickly	-1.26	2.99 (1.53)	3.11 (1.50)
Fight if the fire is likely to burn large areas of land	-0.12	2.85 (1.49)	2.86 (1.46)
Wildfires should be fought as soon as they start, no matter the cost	-0.87	3.15 (1.54)	3.23 (1.45)

* $p < 0.05$

Table 31. *Preferences for Wildfire Management and Perceived Effectiveness, by Community Wildfire Management Level*

	t-value	Low Community Level Wildfire Management *(n = 411)*	Moderate to High Community Level Wildfire Management *(n= 798)*
Preference for Fuel Management Techniques			
Fireguards	-1.07	4.17 (1.07)	4.24 (1.00)
Thinning	-1.84	3.92 (1.11)	4.04 (1.03)
Prescribed burning	3.54*	4.07 (1.01)	3.83 (1.13)
Effectiveness of Fuel Management Techniques			
Fireguards	1.21	3.94 (1.03)	3.88 (0.96)
Thinning	-2.29*	3.52 (1.19)	3.68 (1.07)
Prescribed burning	1.49	3.78 (1.05)	3.68 (1.07)

* $p < 0.05$

social characteristics, and response efficacy.

The descriptive results presented in this chapter suggest that there are differences in wildfire risk perception, knowledge levels, awareness, and preferences for wildfire risk reduction polices and fuel management measures and perceived effectiveness of these measures between the study communities and by community level wildfire management group. These main differences between the communities are summarized in Table 32. There were no observed differences between communities in intentions and adoption of wildfire mitigation measures.

The research findings presented in this chapter suggest that overall study

respondents are moderately prepared for a wildfire, completing wildfire mitigation measures particularly if they are measures that are part of routine property maintenance. While overall respondents perceived there to be a moderate risk from wildfires, risk perceptions were higher for respondents from communities with moderate to high levels of community wildfire management. Respondents from these communities perceived the risk from wildfires to be higher and wildfire impacts to be less controllable than respondents from communities with low community level wildfire management. These findings may be because communities with moderate to high levels of community wildfire management were also communities with more direct experience with wildfires which may contribute to respondents' perceived risk and perceptions of the controllability and acceptability of wildfire impacts. As well, risk perception varied depending on the scale of the risk, such as the risk to personal property, community or natural environment. Finally, results showed respondents were fairly knowledgeable about basic fire behaviour and ecology and were moderately aware of the threat from wildfires.

The second objective, to examine WUI residential property owner's wildfire management preferences, was met with the examination of support for community level wildfire risk reduction policies, wildfire suppression and fuel management preferences and the perceived effectiveness of these measures. Wildfire risk reduction policies that did not require much effort from respondents or restrict their choices on their own properties were preferred, such as education programs and reduced insurance premiums. Preferences for fuel management measures varied between communities but generally the highest support was shown for fireguards. Fireguards and prescribed burning were seen as the most effective measures for reducing potential impacts from wildfires while thinning was perceived to be the least effective management measure.

Table 32. Summary of *Community Differences*

	Low Community Level Wildfire Management			Moderate to High Community Level Wildfire Management		
	Edson	High Level	Peace River	Grande Cache	Hinton	Whitecourt
Risk Perceptions						
Perceived wildfire risk to property	Low	Lowest	Low	Highest	High	High
Perceived wildfire risk to community	Low	Lowest	Low	Highest	High	High
Perceived wildfire risk to environment	Low	Lowest	Low	Highest	High	High
Controllability of wildfire impacts to property	High	Highest	High	Lowest	High	High
Likelihood of a wildfire occuring in the next year	Low	Lowest	Low	High	High	Highest
Direct experience with wildfires	Moderate	Moderate	Moderate	High	High	Highest
Threat from wildfires is signficant enough to warrant adoption	High	Highest	High	Lowest	High	High
Critical Awareness						
Think about wildfires	Moderate	Highest	Lowest	Moderate	Moderate	Moderate
Talk about wildfires	Moderate	Highest	Lowest	Moderate	Moderate	Moderate
Wildfire Suppression Preferences						
Let burn unless human safety and public and private structures are in danger	Moderate	Moderate	Moderate	Highest	Moderate	Lowest
Wildfires should be fought as soon as they start, no matter the cost	Moderate	Moderate	Moderate	Lowest	Moderate	Highest
Fuel Management Preferences						
Fireguards	High	Highest	Lowest	High	High	High
Thinning	High	High	Lowest	Highest	High	High
Prescribed Burning	High	Highest	Lowest	High	High	High
Effectivenss of Fuel Management						
Thinning	Moderate	Moderate	Lowest	High	Highest	Moderate
Prescribed Burning	High	Highest	Lowest	High	High	High

5.0 Multivariate Results

This chapter presents the factor analysis results and multivariate regression statistics, and further analyzes the relationships between variables in this study. As well, it addresses the research objective of examining the influence of risk perception, motivations, demographic, social and psychological characteristics on WUI residential property owners' intentions to adopt and adoption of wildfire mitigation measures, as displayed in Paton's (2003) socio-cognitive theoretical model (Figure 3 is presented again to facilitate discussion of the results). Ordinary least squares (OLS) regression was used to separately model each of the three phases of Paton's (2003) model (motivation formation, intention formation and adoption) as well as an added risk perception phase. After each of the phases was separately modeled, OLS regression was used to regress all of the variables prior to (1) intention to adopt mitigation measures in order to test the direct effects of the model variables on intentions. Then OLS regression was used to regress the variables prior to adoption of mitigation measures (with the exception of intention) to test the direct effects on (2) adoption. Finally, OLS regression was used to model the relationship between community level wildfire management and intentions and adoption controlling for all other variables.

5.1 Variables Explained

5.1.1 Formation of risk perception

The influence of knowledge, experience, and demographics on risk

perception is examined in the first phase of the theoretical model (Figure 3). Risk perception refers to survey respondents' general perception of wildfire risk to their property in the next five years. It was measured on a 7-point scale of 1 (no risk) to 7 (great risk). Knowledge refers to general knowledge of wildfires and was measured based on respondents answering 6 statements as true, false or not sure. A knowledge score was calculated on a scale of 1 (low knowledge) to 6 (high knowledge). Experience was determined by whether respondents had any direct (E.g. evacuated because of a wildfire) or indirect (E.g. read or watched coverage of wildfires in the media) experience with wildfires. Direct experience with wildfires included: feeling fear or anxiety because of a wildfire, experiencing discomfort or health problems from smoke from a wildfire, being evacuated or placed on evacuation alert because of a wildfire, having experience or training in fire management or as a firefighter, losing a house or other structure because of wildfire, seeing smoke or flames near a wildfire and indicating that a wildfire had come close to ones' community. Indirect experience included: reading about or watching coverage of wildfires in the media and knowing someone who had lost their house because of a wildfire. Direct experience was treated as a dummy variable with 1 = direct experience and 0 = no direct experience. Indirect experience was also treated as a dummy variable with 1= indirect experience and 0 = no indirect experience. Over 90 percent of respondents had indirect

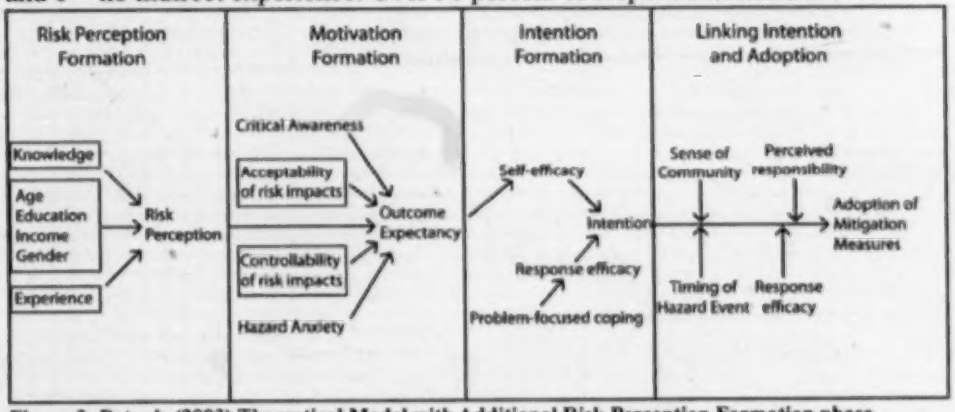

Figure 3: Paton's (2003) Theoretical Model with Additional Risk Perception Formation phase

experience with wildfires.

Demographic variables included age, education, income and gender. Age was measured in years and total household income (before tax in 2006) was measured in six categories. The categories were converted to thousands of dollars based on the midpoints of the categories. The midpoints ranged from $10,000 to $110,000. Educational attainment was measured in five categories: less than high school, high school graduate, some post-secondary education, college or trades certificate or degree, and university or greater. For all of the multivariate regression models, the education variable was treated as a dummy variable with the category 'university or greater' used as the reference category.

5.1.2 Motivation Formation

In the motivation formation phase, the impact of hazard anxiety, critical awareness, general wildfire risk perception, and the perceived acceptability and controllability of wildfire impacts on outcome expectancy was assessed. Outcome expectancy refers to the perception that personal action will effectively mitigate the threat from wildfires. It was measured using the statement "preparing for wildfires will significantly reduce the damage to my house should a wildfire occur," rated on a 5-point scale ranging from strong disagree to strongly agree. Hazard anxiety was measured based on the amount of negative emotion, such as fear or anxiety, respondents felt towards wildfires and their impacts, rated on a 7-point scale ranging from 1 (none) to 7 (high). The perceived acceptability of wildfire impacts to the respondents' property was also measured using a 7-point scale ranging from not at all acceptable (1) to completely acceptable (7). Similarly, perceived controllability of wildfire impacts to the respondents' property was measured using a 7-point scale ranging from not at all controllable (1) to very controllable (7).

Critical awareness refers to the extent to which people think and talk

about a hazard. It was measured using two statements concerning the amount that respondents think and talk about wildfires, rated on a 5-point scale from 'never' to 'one a week or more'. Maximum-likelihood factor analysis[1] identified one factor corresponding to critical awareness (Table 33). Both 'thinking about' and 'talking about' wildfires loaded highly (greater than 0.35) on critical awareness. Reliability analysis indicated a Cronbach's alpha of 0.91 (higher alphas indicate greater reliability). A measure of critical awareness was created for each respondent using factor scoring, which creates a new variable (critical awareness) by multiplying the standardized original variables by the coefficients and then sums the resulting products.

5.1.3 Intention Formation

The intention formation phase of the theoretical model suggests that the effect of outcome expectancy on intention to adopt mitigation measures is mediated through self-efficacy. Self-efficacy refers to a person's judgment of their ability to succeed at reaching a specific goal, such as mitigating the threat from wildfires (Paton, 2003). This phase also suggests that the effect of problem-focused coping (a predisposition to choose action directed at change) on intention is mediated through response efficacy (Paton, 2003). Response efficacy is a person's perception of the resources, such as time, money, and physical skills, available to implement mitigation measures.

Response efficacy, self-efficacy and problem-focused coping were measured using statements rated on a 5-point scale ranging from 'strongly disagree' to 'strongly agree'. Maximum-likelihood factor analysis was again

1. Factor analysis is used to condense a large amount of continuous data into a number of factors characterized by interrelated variables. Maximum-likelihood factor analysis was utilized because it produces better estimates for large samples and can test hypothesis about the number of common factors. Other factoring methods are essentially convenient algorithms but maximum-likelihood factor analysis tests for the significance of each factor as it is extracted (Kline, 1994). In this study, factor analysis was used to analyze the concepts of sense of community, response efficacy, problem-focused coping, self-efficacy and critical awareness.

utilized to identify the factors corresponding to response efficacy, self-efficacy and problem-focused coping (Table 33). All of the statements loaded highly on the appropriate factors and there were no significant cross-loadings. Reliability analysis indicated Cronbach's alphas of 0.90 for problem-focused coping, 0.64 for response efficacy and 0.77 for response efficacy. Again factor scoring was used to create indices for each of these concepts.

Intention was measured by respondents indicating their intention to complete an activity on two scales: one for landscaping activities ('plan to do in the next year', 'plan to do in the next 5 years' and 'do not plan to do.') and

Table 33. *Factor Analysis of critical awareness, sense of community, problem-focused coping, response efficacy, and self-efficacy*

	Factor 1 (Critical Awareness)	Factor 2 (Sense of Community)	Factor 3 (Problem-focused coping)	Factor 4 (Response efficacy)	Factor 5 (Self-efficacy)
Thinking about wildfires	**0.82**	0.05	0.02	0.03	0.02
Talking about wildfires	**0.99**	0.04	0.02	0.05	0.01
Feeling of belonging in community	0.01	**0.99**	0.07	-0.002	0.05
Interaction with other community members	0.06	**0.56**	0.17	-0.003	0.10
Would not move away from community	0.01	**0.50**	0.03	-0.01	0.07
Strategic when dealing with problems	0.02	0.14	**0.85**	0.08	0.2
Think about how to best handle problems	0.04	0.17	**0.84**	0.07	0.29
Skills to complete mitigation measures	0.02	0.02	0.01	**0.96**	0.04
Physically able to complete mitigaton measures	-0.02	-0.06	0.05	**0.55**	0.01
Money available to make changes	0.05	0.03	0.03	**0.35**	0.03
Control over what happens in life	0.04	0.13	0.18	0.05	**0.79**
Solve most problems without assistance	-0.01	0.12	0.28	0.04	**0.70**
Explained variance (%)	48%	36%	14%	10%	7%
Raw Cronbach α	0.91	0.66	0.90	0.64	0.77

one for structural ('plan to do in `the next five years', 'plan to do when it needs replacing' and 'do not plan to do.'). Respondents were scored based on their levels of intention, receiving a 0 if they had already done an activity or if it did not apply to them, a 1 for indicating that they planned to do a landscaping activity in the next year or a structural activity in the next five years, a 2 if they planned to landscaping activity in the next five years or a structural activity if it needs replacing, finally respondents received a 3 if they did not plan to do an activity. The intention score for each activity was then summed. This is consistent with how intention was measured by Paton (2006).

Additional variables, not included in Paton's (2003) original model were also examined in this phase, based on factors identified through human dimensions of wildfire (Brenkert-Smith, 2006; Brenkert-Smith et al., 2005; Brenkert-Smith et al., 2006; McGee & McFarlane, n.d.; McGee & McFarlane, n.d.; McGee et al., 2005; McGee, 2005; Munroe et al., 2003; Munroe & Nelson, 2004; Nelson et al., 2005). These studies identified social norms (approval of family and neighbours), implementing mitigation measures as a priority, threat significant enough to warrant adoption, and connections to nature as additional themes which appear to have some influence on decisions to adopt wildfire mitigation measures. As well, the variables FireSmart awareness and self-reliant were added (Please refer to Chapter 2 for further details about these factors).

FireSmart awareness was included because it was thought that awareness of the FireSmart program and its suggested wildfire mitigation activities would affect intentions to adopt and adoption of wildfire mitigation measures. FireSmart awareness was measured by respondents indicating if they had heard of the term FireSmart. It was treated as a dummy variable with 1 = aware of FireSmart and 0 = not aware of FireSmart.

Self-reliant was intended to be used as a measure of problem-focused

coping, but factor analysis showed that self-reliant did not load with the other measures of problem-focused coping. Therefore it was included in the analysis as its own variable. Self-reliant was measured using the statement "I sometimes feel helpless when dealing with problems," rated on a 5-point scale ranging from 'strongly disagree' to 'strongly agree'.

Social approval (whether family or neighbours would approve of the wildfire mitigation measures), priority, connection to nature and threat significance (whether the threat from wildfires is significant enough to warrant adoption of mitigation measures) were also rated on a 5-point scale ranging from strongly disagree to strongly agree. Social approval were measured using the statement "If I made all or some of the suggested changes, my family or neighbours would like it." Priority was measured using the statement "Implementing these activities is a priority for me." Connection to nature was measured with the statement "If I made these changes I would not feel as connected to nature" and threat significance was measured with the statement "I do not consider the threat of wildfire significant enough to warrant doing some of the activities." Threat significance measures perceptions of the threat from wildfires in relation to adoption of mitigation measures.

5.1.4 Linking Intention and Adoption

The final phase of the Paton's (2003) model examined the link between intention and adoption of mitigation measures and the effect of sense of community, perceived responsibility, timing of a hazard event and response efficacy as moderating variables. In this study, the influence of sense of community, perceived responsibility, and timing of a hazard event and response efficacy on adoption was examined.

Sense of community, the feeling of attachment one has for their community, was measured using three statements rated on a 5-point scale of

strongly disagree to strongly agree. Maximum-likelihood factor analysis was again utilized to identify a factor corresponding to sense of community (Table 33). All of the measures loaded highly on the sense of community factor and there were no significant cross-loadings. Reliability analysis indicated a Cronbach's alphas of 0.66 for sense of community. Again factor scoring was used to create a new variable for sense of community.

Timing of a hazard event refers the perception that a hazard event will occur in the near future. It was measured by how likely respondents perceived that a wildfire would occur near their community in the next year on a 5-point scale of very unlikely to very likely with 3 = not sure. Perceived responsibility, respondents perception that they are personally responsible for reducing the wildfire risk to their property well before a wildfire occurs, was also measured on a 5-point scale ranging from strongly disagree to strongly agree.

Adoption of wildfire mitigation measures was measured based on the FireSmart manual's landscaping and structural wildfire mitigation activities (Please refer to Chapter 4 for a detailed description of the specific landscaping and structural mitigation measures). Respondents indicated if they had completed each of the 13 wildfire mitigation measures and their responses were summed to create a score for the number of wildfire mitigation activities completed. The scale ranged from no activities completed (0) to all of the activities completed (13). Using a summed score of completed activities is consistent with other research measuring the adoption of wildfire mitigation measures (McGee, 2005; Paton et al., 2006).

Community level wildfire management was also included as an independent variable (Please refer to Chapter 3 for an explanation of how levels of community wildfire management were determined) to examine its affect on adoption of mitigation. Community level wildfire management was then treated as

a dummy variable, with 1= respondents living in a moderate to high community wildfire management community (Grande Cache, Hinton and Whitecourt) and 0 = respondents living in a low community wildfire management community (Edson, High Level and Peace River).

5.2 Testing the Theoretical Model

5.2.1 Risk Perception Formation Phase

Each phase of the theoretical model was regressed separately to examine the relationships between variables at each stage of the model. While not part of Paton's (2003) socio-cognitive preparedness model, factors such as gender, education, age, income, knowledge of a hazard and experience are prominent in the literature as influencing risk perception and therefore were tested in this study (Table 34). The OLS regression model of factors influencing risk perception formation was statistically significant at the $p<0.001$ level. Gender was a significant factor in the model, indicating that males, on average had a lower level of wildfire risk perception than females. This result is consistent with the risk literature in which women are generally found to have higher perceptions of risk than men (Davidson & Freudenburg, 1996; Kirschenbaum, 2006). Direct experience was also a significant term ($p<0.0001$). Respondents with direct experience with wildfires had significantly higher levels of risk perception than those without direct experience with wildfires.

5.2.2 Motivation Formation Phase

The first phase of Paton's (2003) socio-cognitive theoretical model is the motivation formation phase. Paton suggests that risk perception, hazard anxiety and critical awareness influence outcome expectancy. The risk literature explains that risk perception is a complicated concept and many factors contribute to the formation of risk perceptions (McDaniels et al., 1997). Paton's (2003) model

Table 34. *Ordinary Least Squares regression of factors influencing risk perception formation*

	Risk Perception		
	Unstandardized Coefficients		Standardized Coefficients
	Beta	Std. Error	Beta
Gender			
Male	-0.41*	(0.12)	-0.12
(Female)			
Education			
Less than high school	0.06	(0.22)	0.01
High school	-0.10	(0.18)	-0.02
Some post-secondary	-0.18	(0.19)	-0.03
College or trades	-0.16	(0.15)	-0.04
(University)			
Age	0.005	(0.005)	0.04
Income (000s)	0.002	(0.002)	0.04
Knowledge	-0.03	(0.04)	-0.03
Direct Experience			
Yes	0.58**	(0.14)	0.13
(No)			
Indirect Experience			
Yes	0.13	(0.26)	0.02
(No)			
Constant	3.10		
Adjusted R^2	0.022		
F-value	3.22**		
n	976		

Note: * $p<0.001$, ** $p<0.0001$

does not provide a specific measure of risk perception; instead it explains risk perception to be an independent variable in the motivation formation phase of the model. McDaniels et al. (1997) found that the controllability of the impacts from a perceived risk and the acceptability of the impacts from a perceived risk, among other factors, strongly contribute to the overall formation of risk perception. Therefore, in addition to general perceived risk, acceptability and controllability of wildfire impacts to ones' property were also examined and incorporated into this study as independent variables in the motivation formation phase.

To analyze the motivation formation phase, Paton's (2003) original

variables (critical awareness, hazard anxiety and general risk perception) were first regressed to determine their effect on outcome expectancy (Table 35, Model A-MF) and then the new risk variables perceived controllability and acceptability were added to the model (Model B-MF) (Table 35). Both Model A-MF and Model B-MF (model with acceptability and controllability variables) are significant ($p<0.0001$).

Model A-MF shows the effect of critical awareness, hazard anxiety and perception of wildfire risk on outcome expectancy. Risk perception ($p<0.01$) and hazard anxiety ($p<0.0001$) are both significant terms. The greater a respondents' perception of the wildfire risk to their property, the greater their perception that personal actions will effectively mitigate the wildfire risk (outcome expectancy). Also, the more anxious respondents are about wildfires, the greater their outcome expectancy. Approximately six percent of the variation in outcome expectancy can be explained by critical awareness, hazard anxiety and wildfire risk perception.

When perceived acceptability and controllability of wildfire impacts

Table 35. *Ordinary Least Squares Regression of factors influencing motivation formation*

	Outcome Expectancy					
	Model A - MF			Model B - MF		
	Unstandardized Coefficients		Standardized Coefficients	Unstandardized Coefficients		Standardized Coefficients
	Beta	Std. Error	Beta	Beta	Std. Error	Beta
Perception of wildfire risk to property	0.06*	(0.02)	0.10	0.08**	(0.02)	0.13
Critical Awareness	0.07	(0.03)	0.06	0.07	(0.04)	0.06
Hazard Anxiety	0.08***	(0.02)	0.16	0.07***	(0.02)	0.14
Acceptability of wildfire impacts to property				-0.04	(0.02)	-0.06
Controllability of wildfire impacts to property				0.07**	(0.02)	0.11
Constant	3.13			2.81		
Adjusted R^2	0.057			0.070		
F for change in R^2	18.68***			14.19***		
n	871			871		

Note: *$p<0.01$, **$p<0.001$, ***$p<0.0001$

to property are added in Model B-MF, only controllability has a significant (p<0.001) association with outcome expectancy. If a respondent perceives the impacts from a wildfire to be controllable then they are likely to believe that personal actions will actually mitigate the risks from wildfire. With the addition of these two variables, approximately 7 percent of variation in outcome expectancy is explained (only slightly more than Model A-MF). A test of the fit[2] of Model A-MF and Model B-MF showed that Model B-MF is a better fit for the data and therefore acceptability and controllability will be included in further OLS regression models.

The addition of the acceptability and controllability variables resulted in some change in the coefficients for hazard anxiety and risk perception. Risk perception and hazard anxiety remain significantly associated with outcome expectancy. There is a (0.08-0.06)/0.08 = 25% increase in the effect of risk perception on outcome expectancy and a (0.07-0.08)/0.07 = 14% decrease in the effect of hazard anxiety on outcome expectancy. Overall, the controllability of wildfire impacts to property, wildfire risk perception and hazard anxiety were found to be the only significant motivation formation factors.

5.2.3 Intention Formation Phase

Intention formation is the second phase of Paton's (2003) socio-cognitive theoretical model. It proposes that the effect of outcome expectancy on intentions to adopt mitigation measures is mediated through self-efficacy and that the effect of problem-focused coping on intention is mediated through response efficacy (perception of the available resources required to implement the mitigation measures). To test for these mediating relationships, first the relationship between outcome expectancy and intention was modeled and then self-efficacy was added

2. The following equation was used to compare the models and the f-value was compared to the f-critical to determine if the more full model was a better fit for the data (Fox, 1997).

$$\frac{R^2_{full} - R^2_{less\,full} / p_{full} - p_{less\,full}}{1 - R^2_{full} / N - p_{full} - 1} = \Delta F$$

to the model to see if the effect of outcome expectancy on intention is mediated by self-efficacy. Following this the relationship between problem-focused coping and intention was modeled. Response efficacy was added to the problem-focused coping model to see if the effect of problem-focused coping on intention is explained by response efficacy.

When outcome expectancy and intentions to adopt wildfire mitigation measures were regressed in Table 36, a significant relationship is found between outcome expectancy and intentions ($p<0.0001$) (Model A-OE). The more a respondent perceived that personal action would mitigate wildfire risk, the greater their intentions to adopt wildfire mitigation measures. When self-efficacy is added in Model B-OE (to test for a mediating relationship), outcome expectancy remains significant ($p<0.0001$) and there is no change in the coefficient for outcome expectancy. Self-efficacy is not significant. There is a direct relationship between outcome expectancy and intentions to adopt wildfire mitigation measures. Self-efficacy is therefore not a mediating variable.

Similar results were found when the relationship between problem-focused coping and intentions were modeled (Table 37). The results show that

Table 36. *Ordinary Least Squares Regression of the effect of outcome expectancy on intention*

	Intention					
	Model A - OE			Model B - OE		
	Unstandardized Coefficients		Standardized Coefficients	Unstandardized Coefficients		Standardized Coefficients
	Beta	Std. Error	Beta	Beta	Std. Error	Beta
Outcome Expectancy	1.20*	(0.21)	0.20	1.20*	(0.21)	0.20
Self-efficacy				0.13	(0.24)	0.02
Constant	25.59			25.59		
Adjusted R^2	0.038			0.037		
F for change in R^2	34.07*			17.18*		
n	839			839		

Note: *$p<0.0001$

Table 37. *Ordinary Least Squares Regression of the effect of problem-focused coping on intention*

	Intention					
	Model A - PF			Model B - PF		
	Unstandardized Coefficients		Standardized Coefficients	Unstandardized Coefficients		Standardized Coefficients
	Beta	Std. Error	Beta	Beta	Std. Error	Beta
Problem-focused coping	0.21	(0.23)	0.03	0.20	(0.23)	0.03
Response efficacy				0.44*	(0.22)	0.07
Constant	30.00			30.00		
Adjusted R^2	-0.000			0.003		
F for change in R^2	0.85			2.42		
n	839			839		

Note: *$p<0.05$

the problem-focused coping is not significantly associated with intention (Model A-PF). This result violates the first condition necessary for mediation: there must be a significant relationship between the predictor (in this case problem-focused coping) and the criterion (intention) (Tarrant et al., 1997). Since problem-focused coping is not significantly associated with intention, a mediating effect is not possible. Response efficacy, though, is significantly related to intention ($p<0.05$). This indicates that the greater a respondent's perception that they have the money, skills and physical ability required to implement the mitigation measures (response efficacy), the greater a respondent's intention to adopt mitigation measures.

As both the mediating relationships suggested by Paton's (2003) model were not found to be significant in this study, the intention component of the model was tested using multivariate regression to determine the direct effect of outcome expectancy, self-efficacy, problem-focused coping and response efficacy on intentions to adopt wildfire mitigation measures (Table 38: Model A-IF). Model A-IF (with original variables) proposes that the more respondents perceive personal actions to effectively mitigate wildfire risks (outcome expectancy),

the greater their intention to adopt wildfire mitigation measures ($p<0.0001$) and that the greater respondents perceive there to be resources available (response efficacy), the greater the intention to adopt ($p<0.05$). The adjusted r-square value is 0.0437 which means that the variables included in Model A-IF only explain 4.37 percent of the variation in intention to adopt wildfire mitigation measures.

Given this finding, other variables identified in human dimensions of wildfire literature as influencing adoption of mitigation measures (threat significance, social approval, priority and connection to nature) and the variables FireSmart awareness and self-reliance were added to the model. The variable self-reliance was originally proposed, by Paton, as a measure of problem-focused coping but factor analysis found that it did not load with the other measures of problem-focused coping and actually seemed to measure its own concept. The variable self-reliant was added into the model in order to determine if it was

Table 38. *Ordinary Least Squares Regression of factors influencing intention formation*

	Intention					
	Model A - IF			Model B - IF		
	Unstandardized Coefficients		Standardized Coefficients	Unstandardized Coefficients		Standardized Coefficients
	Beta	Std. Error	Beta	Beta	Std. Error	Beta
Outcome Expectancy	1.22**	(0.21)	0.20	0.51*	(0.21)	0.08
Self-efficacy	0.17	(0.24)	0.02	0.08	(0.24)	0.01
Response efficacy	0.44*	(0.22)	0.07	0.35	(0.22)	0.05
Problem-focused coping	0.17	(0.23)	0.03	0.18	(0.22)	0.03
Self-reliant				0.19	(0.21)	0.03
Threat significance				0.69**	(0.18)	0.14
Social approval				0.04	(0.19)	0.01
Priority				1.66**	(0.24)	0.25
Connection to nature				0.21	(0.18)	0.04
FireSmart Awareness				-1.03*	(0.43)	-0.08
Constant	25.51			20.85		
Adjusted R^2	0.044			0.151		
F for change in R^2	10.30**			15.47**		
n	816			816		

Note: * $p<0.05$, ** $p<0.0001$

a significant term by itself. FireSmart awareness was added as the FireSmart program recommends property level wildfire risk reduction activities and it was hypothesized that awareness of this program would affect intentions and adoption.

When these additional variables were added to the original intention formation model, approximately 15 percent of the variation in intention can be attributed to variance in Model B-IF variables (Table 38). This is a 10 percent increase from Model A-IF and a test of fit showed that Model B-IF is a better fit for the data. These results suggest that factors in Model B-IF explain more of the variance in intentions to adopt wildfire mitigation measures.

The results from Model B-IF also indicate that, of Paton's original variables, only outcome expectancy was significant. The greater a respondent's perception that personal action will mitigate risk the higher a respondents' intentions to adopt wildfire mitigation measures ($p < 0.0001$). There is a (0.50823-1.22425)/ 0.50823= 141% reduction from Model A-IF to Model B-IF in the coefficient for outcome expectancy, which indicates that the additional variables somewhat moderate the effect of outcome expectancy on intentions but the do not account for all of the association. The effect of response efficacy on intentions becomes insignificant when the additional variables are added to the model (Model B-IF). This indicates that the additional variables mediate the relationship between response efficacy and intentions.

Of the additional variables, only awareness of FireSmart ($p<0.05$), threat significance ($p<0.001$) and priority ($p<0.0001$) were significant. Compared to those respondents who had not heard of the term FireSmart, respondents, who had heard of the term FireSmart, had lower intentions to adopt wildfire mitigation measure. As well, the greater respondents' perceived the significance of the wildfire threat to warrant adoption of wildfire mitigation measures, the greater their intentions to adopt wildfire mitigation measures. Similarly, the greater

priority placed on implementing wildfire mitigation measures, the greater the intention to adopt wildfire mitigation measures.

Other variables that were identified by human dimensions of wildfire research (social approval and connection to nature) were not significant. The results showed that the variable measuring respondents' perceptions of feelings of helplessness when dealing with problems (self-reliant) was also not significant. Therefore the results of this study indicate that response efficacy, outcome expectancy, threat significance and priority are significant factors affecting intentions to adopt wildfire mitigation measures but explain only a modest amount of variance (15%) (Table 38).

5.2.4 Linking Intention to Adoption Phase

The final phase of Paton's (2003) model examines the link between intention and adoption of mitigation measures. Paton (2003) suggests that the link is moderated by response efficacy, timing of a hazard event, perceived responsibility and sense of community. In order to test the moderating effect of these variables this study would have had to first examine respondents' intentions to adopt wildfire mitigation actions and then distribute a second questionnaire to determine if intentions turned into actual adoption. This study did not employ two phases. As a result this final phase of Paton's (2003) model cannot be tested exactly as Paton outlined. Instead, multivariate regression was used to determine if there was a significant, direct relationship between response efficacy, timing of a hazard event, perceived responsibility, sense of community and adoption of wildfire mitigation measures.

The results presented here indicate that there is a significant relationship between response efficacy, perceived responsibility, sense of community and the adoption of wildfire mitigation measures ($p<0.01$). Findings in Table 39 show that the greater the respondents' perception of available resources the greater the

Table 30 *Ordinary Least Squares regression of factors influencing adoption of wildfire mitigation measures*

	Adoption		
	Unstandardized Coefficients		Standardized Coefficients
	Beta	Std. Error	Beta
Response efficacy	0.27*	(0.10)	0.09
Timing of Hazard Event	0.07	(0.08)	0.03
Perceived Responsibility	0.38*	(0.12)	0.10
Sense of Community	0.29*	(0.09)	0.10
Constant	4.87		
Adjusted R^2	0.0291		
F-value	7.62**		
n	885		

Note: * $p<0.05$, ** $p<0.01$, *** $p<0.0001$

adoption of mitigation measures (response efficacy), and the more respondent's perceive themselves to be responsible for reducing the risks from wildfires on their own property (perceived responsibility) the greater the adoption of mitigation measures. The results also indicate that the greater respondents sense of community (feelings of attachment to their community) the more likely they are to adopt wildfire mitigation measures. Timing of hazard event (the likelihood that a wildfire would occur near the community in the next year) was not significantly associated with adoption. While response efficacy, perceived responsibility and sense of community were found to be significant terms in the model, very little of the variance in adoption of mitigation measures is explained (approximately 3 percent). This is to be expected since Paton's (2003) model hypothesizes that these variables are mediating variables and therefore do not explain much of the variance in adoption.

5.3 Factors influencing Intentions to adopt wildfire mitigation measures

In the previous four sections of this chapter, the phases of Paton's (2003) theoretical model were regressed to examine relationships between the variables included in his model. This section will further describe the

relationship between the variables by presenting regressions of the variables in the models and intention. In Table 40, Model A-Intent shows the relationship between demographics, experience and knowledge and intentions to adopt wildfire mitigation measures. Model B-Intent displays the relationship between risk perception, critical awareness, hazard anxiety and intention, controlling for demographic, experience and knowledge factors. Finally, Model C-Intent (Table 40 continued), adds the intention formation variables (response efficacy, self efficacy, problem-focused coping, outcome expectancy, threat significance, priority, social approval, connection to nature, self-reliant and FireSmart awareness). All of the models were significant ($p<0.0001$).

In Model A-Intent, direct experience ($p<0.001$), all of the education categories ($p<0.05$), age ($p<0.05$) and income ($p<0.01$) were significantly related to intentions. However with the addition of other variables in Model B-Intent, direct experience, age, and income remain significant, but of the education categories only 'some post-secondary' and 'college or trades' remain significant. Hazard anxiety ($p<0.05$), perceived controllability of wildfire impacts ($p<0.01$), and outcome expectancy ($p<0.0001$) were also significantly related to intentions in Model B-Intent.

With the addition of more variables in Model C-Intent, the significant factors from Model B-Intent remain significant with the exception of direct experience and hazard anxiety. This indicates that direct experience and hazard anxiety do not directly influence intentions to adopt wildfire mitigation measures but are potentially mediated through one or more of the variables added in Model C-Intent (self-efficacy, response efficacy, problem-focused coping, self-reliant, threat significant, social connections, priority, connection to nature and FireSmart awareness). Also, with the addition of these variables, the variable 'acceptability of wildfire impacts to property' becomes significant

Table 40. *Ordinary Least Squares Regression of factors influencing intentions to adopt wildfire mitigation measures*

	Intention					
	Model A - Intent			Model B - Intent		
	Unstandardized Coefficients		Standardized Coefficients	Unstandardized Coefficients		Standardized Coefficients
	Beta	Std. Error	Beta	Beta	Std. Error	Beta
Gender						
Male	0.29	(0.49)	0.02	0.4	(0.48)	0.03
(Female)						
Education						
Less than high school	1.98*	(0.95)	0.09	1.57	(0.93)	0.07
High school	1.67*	(0.71)	0.11	1.29	(0.70)	0.08
Some post-secondary	1.97*	(0.78)	0.11	1.77*	(0.76)	0.09
College or trades	1.41*	(0.59)	0.11	1.26*	(0.58)	0.10
(University)						
Age	0.05*	(0.02)	0.10	0.05**	(0.02)	0.10
Income	-0.02**	(0.01)	-0.11	-0.02*	(0.01)	-0.08
Knowledge	-0.17	(0.16)	-0.04	-0.004	(0.17)	-0.01
Direct Experience						
Yes	1.65**	(0.60)	0.10	1.40*	(0.60)	0.09
(No)						
Indirect Experience						
Yes	0.53	(1.09)	0.02	0.13	(1.07)	0.004
(No)						
Wildfire Risk Perception to property	0.08	(0.13)	0.02	-0.05	(0.15)	-0.02
Critical Awareness				0.17	(0.24)	0.03
Hazard Anxiety				0.28*	(0.13)	0.10
Acceptability of wildfire impacts to property				0.29	(0.15)	0.07
Controllability of wildfire impacts to property				0.47**	(0.15)	0.12
Outcome Expectancy				0.89***	(0.22)	0.15
Self-efficacy						
Response efficacy						
Problem-focused coping						
Self-reliant						
Threat significance						
Social approval						
Priority						
Connection to nature						
FireSmart Awareness						
Constant	27.18			19.88		
Adjusted R^2	0.047			0.097		
F for change in R^2	4.13***			5.67***		
n	694			694		

Note: * $p<0.05$, **$p<0.01$, ***$p<0.0001$

Table 40 continued. *Ordinary Least Squares Regression of factors influencing intentions to adopt wildfire mitigation measures*

	Intention Variables		
	Model C - Intent		
	Unstandardized Coefficients		Standardized Coefficients
	Beta	Std. Error	Beta
Gender			
Male	0.39	(0.47)	0.03
(Female)			
Education			
Less than high school	1.56	(0.90)	0.07
High school	0.94	(0.90)	0.06
Some post-secondary	1.69*	(0.72)	0.09
College or trades	1.07*	(0.56)	0.09
(University)			
Age	0.03	(0.02)	0.07
Income	-0.02*	(0.01)	-0.08
Knowledge	-0.04	(0.16)	-0.01
Direct Experience			
Yes	0.99	(0.57)	-0.06
(No)			
Indirect Experience			
Yes	-0.05	(1.02)	-0.002
(No)			
Wildfire Risk Perception to property	-0.22	(0.14)	-0.06
Critical Awareness	-0.01	(0.24)	-0.001
Hazard Anxiety	0.14	(0.13)	0.05
Acceptability of wildfire impacts to property	0.32*	(0.14)	0.07
Controllability of wildfire impacts to property	0.40**	(0.14)	0.10
Outcome Expectancy	0.39	(0.22)	0.07
Self-efficacy	0.03	(0.25)	0.004
Response efficacy	0.55*	(0.24)	0.09
Problem-focused coping	0.31	(0.23)	0.05
Self-reliant	0.31	(0.23)	0.05
Threat significance	0.78***	(0.20)	0.16
Social approval	0.09	(0.20)	0.02
Priority	1.50***	(0.26)	0.23
Connection to nature	0.11	(0.20)	0.02
FireSmart Awareness	0.56	(0.47)	0.04
Constant	15.64		
Adjusted R^2	0.1959		
F for change in R^2	7.75***		
n	694		

Note: * $p<0.05$, ** $p<0.01$, *** $p<0.0001$

($p<0.05$). Of the variables added in Model C-Intent threat significance ($p<0.0001$), priority ($p<0.0001$) and response efficacy ($p<0.05$) were the only factors that significantly influence intentions. Psychological and social factors such as self-efficacy, problem-focused coping, self-reliance, and social approval, connection to nature and whether people are aware of FireSmart were not significant factors.

Across all models, respondents with some post-secondary education and respondents with college or trades certificates have significantly higher levels of intention than respondents with a University or greater educational attainment. Income was also significant across all models and this result indicated that those with lower income levels have higher intentions to adopt mitigation measures, but this relationship (-0.02) was weak. Controllability of wildfire impacts to property and outcome expectancy were significant in both Model B-Intent and C-Intent and threat significance, priority and response efficacy were significant in Model C-Intent.

These results indicate that age, educational attainment, particularly higher levels of education attainment, income, and outcome expectancy, perceived controllability of wildfire impacts, threat significance, response efficacy and priority are important contributors in explaining intentions to adopt wildfire mitigation measures. A comparison of models showed that Model C-Intent best explains the variation in intentions to adopt wildfire mitigation and in fact explains close to 20 percent of the variation. This result indicates that these variables explain some of people's intentions to adopt wildfire mitigation measures but that a large portion of variance remains to be explained.

5.4 Factors influencing Adoption of wildfire mitigation measures

This section describes factors influencing adoption of wildfire mitigation measures as well as the relationships between all of the variables by displaying

regressions of all of the variables in the model and adoption. First, the relationship between adoption of wildfire mitigation measures and perception of wildfire risk to property, demographics, experience and knowledge is examined (Table 41: Model A-Adopt). Then measures of risk perception (perceived acceptability and controllability of impacts), critical awareness, hazard anxiety and outcome expectancy are added to examine their relationship with adoption controlling for demographic, experience and knowledge factors (Table 41: Model B-Adopt). Intention formation variables (response efficacy, self efficacy, problem-focused coping, outcome expectancy, threat significance, priority, social approval, connection to nature, self-reliant and FireSmart awareness) were then added in Model C-Adopt and their relationship with adoption is examined when all other variables were controlled (Table 41). Finally, in Model D-Adopt, the variables sense of community, timing of hazard event and perceived responsibility are added (Table 41).

All models were significant ($p<0.0001$). The variable 'perceptions of wildfire risk to property' is significantly associated with adoption ($p<0.05$) in Model A-Adopt but with the addition of the variables in Model B-Adopt this relationship is no longer significant. It remains insignificant in Models C-Adopt and D-Adopt. This result indicates that relationship between wildfire risk perceptions and adoption is potentially mediated through other variables. Similarly, outcome expectancy is significant ($p<0.01$) in Model B-Adopt but with the addition of the variables in Model C-Adopt, it is not significant and remains not significant in Model D-Adopt. The effect of outcome expectancy on adoption of wildfire mitigation measures is also potentially mediated through other variables.

Across all models, age is significantly related to adoption, indicating that the older the respondent the greater the adoption of wildfire mitigation measures

Table 41. *Ordinary Least Squares Regression of factors influencing adoption of wildfire mitigation measures*

	Adoption					
	Model A - Adopt			Model B - Adopt		
	Unstandardized Coefficients		Standardized Coefficients	Unstandardized Coefficients		Standardized Coefficients
	Beta	Std. Error	Beta	Beta	Std. Error	Beta
Gender						
Male	0.16	(0.22)	0.03	0.13	(0.22)	0.03
(Female)						
Education						
Less than high school	0.32	(0.42)	0.03	0.22	(0.32)	0.02
High school	0.11	(0.32)	0.02	0.02	(0.32)	0.003
Some post-secondary	0.15	(0.35)	0.02	0.13	(0.34)	0.02
College or trades	0.11	(0.26)	0.08	0.40	(0.26)	0.07
(University)						
Age	0.04****	(0.01)	0.17	0.04****	(0.01)	0.17
Income	0.001	(0.004)	0.01	0.003	(0.003)	0.03
Knowledge	-0.08	(0.07)	-0.04	-0.05	(0.07)	-0.03
Direct Experience						
Yes	0.66*	(0.27)	0.09	0.66*	(0.27)	0.09
(No)						
Indirect Experience						
Yes	-0.25	(0.50)	-0.02	-0.39	(0.49)	-0.03
(No)						
Perception of wildfire risk to property	0.12*	(0.06)	0.08	0.13	(0.07)	0.08
Critical Awareness				0.03	(0.11)	0.01
Hazard Anxiety				0.003	(0.06)	0.002
Acceptability of wildfire impacts to property				0.19**	(0.07)	0.10
Controllability of wildfire impacts to property				0.19**	(0.66)	0.11
Outcome Expectancy				0.32**	(0.10)	0.12
Self-efficacy						
Problem-focused coping						
Response efficacy						
Self-reliant						
Threat significance						
Social connections						
Priority						
Connection to nature						
FireSmart Awareness						
Sense of Community						
Perceived Responsibility						
Timing of Hazard Event						
Constant	4.15			1.52		
Adjusted R^2	0.036			0.068		
F for change in R^2	3.48****			4.27****		
n	722			722		

Note: * $p<0.05$, ** $p<0.01$, *** $p<0.001$, **** $p<0.0001$

Table 41 continued. *Ordinary Least Squares Regression of factors influencing adoption of wildfire mitigation measures*

	Adoption					
	Model C - Adopt			Model D - Adopt		
	Unstandardized Coefficients		Standardized Coefficients	Unstandardized Coefficients		Standardized Coefficients
	Beta	Std. Error	Beta	Beta	Std. Error	Beta
Gender						
Male	0.16	(0.21)	0.03	0.18	(0.21)	0.03
(Female)						
Education						
Less than high school	0.23	(0.40)	0.02	0.26	(0.41)	0.03
High school	0.04	(0.31)	0.01	0.05	(0.31)	0.01
Some post-secondary	0.24	(0.33)	0.03	0.25	(0.33)	0.03
College or trades	0.27	(0.25)	0.07	0.37	(0.25)	0.07
(University)						
Age	0.03****	(0.01)	0.14	0.03***	(0.01)	0.13
Income	0.003	(0.004)	0.03	0.003	(0.004)	0.03
Knowledge	-0.05	(0.07)	-0.03	-0.05	(0.07)	-0.03
Direct Experience						
Yes	0.47	(0.26)	0.07	0.46	(0.27)	0.06
(No)						
Indirect Experience						
Yes	-0.51	(0.27)	-0.03	-0.55	(0.47)	-0.04
(No)						
Perception of wildfire risk to property	0.02	(0.06)	0.01	0.01	(0.07)	0.01
Critical Awareness	-0.003	(0.11)	-0.001	-0.005	(0.11)	-0.002
Hazard Anxiety	-0.04	(0.06)	-0.03	-0.04	(0.06)	-0.03
Acceptability of wildfire impacts to property	0.18**	(0.07)	0.1	0.18**	(0.07)	0.1
Controllability of wildfire impacts to property	0.14*	(0.06)	0.08	0.14*	(0.06)	0.08
Outcome Expectancy	0.17	(0.10)	0.06	0.14	(0.10)	0.05
Self-efficacy	0.05	(0.11)	0.01	0.05	(0.12)	0.01
Response efficacy	0.22*	(0.11)	0.08	0.22*	(0.11)	0.08
Problem-focused coping	0.20	(0.11)	0.07	0.19	(0.11)	0.06
Not helpless	0.15	(0.10)	0.06	0.15	(0.10)	0.05
Threat significance	0.51***	(0.09)	0.23	0.51****	(0.09)	0.22
Social approval	-0.15	(0.09)	-0.06	-0.16	(0.09)	-0.06
Priority	0.43***	(0.12)	0.15	0.43***	(0.12)	0.15
Connection to nature	0.004	(0.09)	0.002	-0.01	(0.09)	-0.003
FireSmart Awareness	-0.02	(0.21)	-0.003	-0.03	-0.21	-0.005
Sense of Community				0.13	(0.09)	0.05
Perceived Responsibility				0.11	(0.13)	0.03
Timing of Hazard Event				-0.01	(0.09)	-0.004
Constant	0.67			0.56		
Adjusted R^2	0.1566			0.1563		
F for change in R^2	6.36****			5.77****		
n	722			722		

Note: * $p<0.05$, ** $p<0.01$, *** $p<0.001$, **** $p<0.0001$

even when other variables are controlled for (p<0.0001). There is a slight decrease in the coefficient for age from Model B-Adopt to Model C-Adopt, but it remains significant. This result indicates that while the other variables may slightly moderate the relationship between age and adoption, there is still a direct effect of age on adoption.

Another significant finding is that the higher the perception of the controllability of wildfire impacts the greater the adoption of wildfire mitigation measures. Controllability is significant at the p<0.01 level in Model B-Adopt but the significance slightly decreases to at the p<0.05 level for Model C-Adopt and D-Adopt. As well, the addition of other variables in Model C-Adopt, decreases the coefficient by (0.13867-0.18832)/- 0.13867=35.80 percent, showing that controllability is somewhat moderated by other variables in the model. With the addition of even more variables in Model D-Adopt, the coefficient for controllability further decreases by (0.13577-0. 13867)/ 0.13577= 2.14 percent. The relationship between controllability of wildfire impacts and adoption is somewhat moderated by other variables, but a direct relationship still remains.

The results also indicate that the greater the acceptability of wildfire impacts the greater the adoption of wildfire mitigation measures. Acceptability is significant at the p<0.01 level across all models. The addition of other variables in Model C-Adopt, decreases the coefficient by (0.18002-0.19269)/ 0.18002= 7.04 percent, showing that the variable measuring acceptability is somewhat moderated by other variables in the model. With the addition of even more variables in Model D-Adopt, the coefficient for acceptability actually increases slightly by (0.18286-0.18002)/ 0.18286= 1.55 percent. The relationship between acceptability of wildfire impacts and adoption is somewhat moderated by other variables, but a direct relationship still remains.

The variables threat significance and priority are also significant terms

in both Model C-Adopt and Model D-Adopt. Threat significance, whether respondents perceived the threat from wildfires as significant enough to warrant adoption of mitigation measures, is significantly related to adoption ($p<0.0001$). There is a very small reduction, (0.50680-0.51087)/ 0.50680= 0.80 percent, in the effect of threat significance on adoption when the additional variables are added in Model D-Adopt. This reduction, though, is very small and the variable remains significant. This indicates that threat significance is an important factor influencing adoption. Priority, whether adopting wildfire mitigation measures is a priority for respondents, is also an important factor influencing adoption. At the $p<0.0001$ level, priority is significant in both Model C-Adopt and Model D-Adopt and there is no change in the coefficient.

These results indicate that age, acceptability and controllability of wildfire impacts, threat significance, and priority are important factors influencing adoption of wildfire mitigation measures. Model A-Adopt explains 3.64 percent of the variation in adoption, Model B-Adopt accounts for approximately 6.77 percent of the variation, Model C-Adopt accounts for 15.66 percent and Model D-Adopt accounts for 15.63 percent of the variation in adoption. A test of fit[3] showed that the best fit for the data is Model C-Adopt but Model D-Adopt explains almost the exact same amount of variation in adoption of wildfire mitigation measures. Since both models explain almost the same amount of variance in adoption (difference of 0.03), and Model D-Adopt incorporates more of Paton's (2003) original variables further analysis will use Model D-Adopt.

5.4.1 Adoption of Landscape and Structural Wildfire Mitigation Measures

As the measure of adoption incorporated both landscaping and structural wildfire mitigation measures, it was hypothesized that the variables in Model

3The following equation was used to compare the models and the f-value was compared to the f-critical to determine if the more full model was a better fit for the data (Fox, 1997).

$$\frac{R^2_{full} - R^2_{less\ full} / p_{full} - p_{less\ full}}{1 - R^2_{full} / N - p_{full} - 1} = \Delta F$$

D-Adopt may explain a different level of variation in adoption of landscape measures and structural measures. Therefore two new variables: landscape adoption and structural adoption were created to measure the adoption of landscape wildfire mitigation measures (E.g. keeping grass short and watered) and structural wildfire mitigation measures (E.g. installing fire retardant roofing materials). The landscape adoption variable ranges from 0 (no adoption of landscape measures) to 10 (adoption of all the landscaping activities) and structural adoption variable ranges from 0 (no adoption of structural measures) to 3 (adoption of all the structural activities).

OLS regression was used to model the effect of all of the variables in Model D-Adopt on landscape adoption and structural adoption. Table 42 shows that only 12.60 percent of the variation in adoption of landscape mitigation measures is explained. Age ($p<0.01$), acceptability of wildfire impacts ($p<0.001$), controllability ($p<0.05$), self-reliance ($p<0.05$), threat significance ($p<0.0001$) and priority ($p<0.01$) were significant variables explaining adoption of landscape mitigation measures. Interestingly, the results indicated that, while not significant, respondents who were aware of FireSmart, on average, had lower levels of adoption of landscape measures than those who were not aware of FireSmart.

When OLS regression was used to model the effect of the same variables on adoption of structural wildfire mitigation measures (Table 43), age ($p<0.01$), threat significance ($p<0.001$) and priority ($p<0.01$) were also found to be significant factors explaining adoption of structural mitigation measures. Response efficacy ($p<0.0001$) was also found to be significant. Very little of the variance (approximately 9 percent) in adoption of structural wildfire mitigation measures was explained by these variables. The model appears to work better for explaining adoption of landscaping measures over structural measures.

These results indicate the variables in Model

Table 42. *Ordinary Least Squares Regression of factors influencing adoption of landscape wildfire mitigation measures*

	Landscape Measures Adoption		
	Unstandardized Coefficients		Standardized Coefficients
	Beta	Std. Error	Beta
Gender			
Male	0.16	(0.19)	0.03
(Female)			
Education			
Less than high school	0.36	(0.36)	0.04
High school	0.13	(0.27)	0.02
Some post-secondary	0.26	(0.29)	0.04
College or trades	0.28	(0.22)	0.06
(University)			
Age	0.02**	(0.01)	0.11
Income	0.004	(0.003)	0.05
Knowledge	-0.10	(0.06)	-0.06
Direct Experience			
Yes	0.43	(0.24)	0.07
(No)			
Indirect Experience			
Yes	-0.45	(0.42)	-0.04
(No)			
Perception of wildfire risk to property	0.02	(0.06)	0.02
Critical Awareness	0.02	(0.10)	0.01
Hazard Anxiety	-0.01	(0.05)	-0.01
Acceptability of wildfire impacts to property	0.21***	(0.06)	0.13
Controllability of wildfire impacts to property	0.12*	(0.06)	0.08
Outcome Expectancy	0.16	(0.09)	-0.07
Self-efficacy	-0.02	(0.10)	-0.01
Response efficacy	0.02	(0.10)	0.01
Problem-focused coping	0.12	(0.09)	0.05
Self-reliant	0.22*	(0.09)	0.09
Threat significance	0.38****	(0.08)	0.20
Social approval	-0.12	(0.08)	-0.05
Priority	0.32**	(0.10)	0.13
Connection to nature	0.02	(0.08)	0.01
FireSmart Awareness	-0.08	(0.19)	-0.02
Sense of Community	0.07	(0.08)	0.03
Perceived Responsibility	0.10	(0.12)	0.03
Timing of Hazard Event	-0.05	(0.08)	-0.02
Constant	-0.26		
Adjusted R^2	0.1260		
F for change in R^2	4.71****		
n	722		

Note: * $p<0.05$, ** $p<0.01$, *** $p<0.001$, **** $p<0.0001$

Table 43. *Ordinary Least Squares Regression of factors influencing adoption of structural wildfire mitigation measures*

	Structural Measures Adoption		
	Unstandardized Coefficients		Standardized Coefficients
	Beta	Std. Error	Beta
Gender			
Male	0.02	(0.08)	0.01
(Female)			
Education			
Less than high school	-0.09	(0.16)	-0.02
High school	-0.08	(0.12)	-0.03
Some post-secondary	-0.01	(0.13)	-0.004
College or trades	0.09	(0.10)	0.04
(University)			
Age	0.01**	(0.003)	0.11
Income	-0.001	(0.002)	-0.03
Knowledge	0.05	(0.03)	-0.07
Direct Experience			
Yes	0.04	(0.11)	0.01
(No)			
Indirect Experience			
Yes	-0.09	(0.19)	-0.02
(No)			
Perception of wildfire risk to property	-0.01	(0.03)	-0.02
Critical Awareness	-0.02	(0.04)	-0.03
Hazard Anxiety	-0.03	(0.02)	-0.05
Acceptability of wildfire impacts to property	-0.02	(0.03)	-0.03
Controllability of wildfire impacts to property	0.01	(0.03)	0.02
Outcome Expectancy	-0.02	(0.04)	-0.02
Self-efficacy	0.07	(0.05)	0.06
Response efficacy	0.20****	(0.08)	0.18
Problem-focused coping	0.07	0.05)	0.06
Self-reliant	-0.07	(0.04)	-0.07
Threat significance	0.12***	(0.04)	0.15
Social approval	-0.04	(0.04)	-0.05
Priority	0.12*	(0.05)	0.11
Connection to nature	-0.03	(0.04)	-0.03
FireSmart Awareness	0.05	(0.08)	0.02
Sense of Community	0.07	(0.04)	0.06
Perceived Responsibility	0.01	(0.05)	0.01
Timing of Hazard Event	0.04	(0.04)	0.04
Constant	0.82		
Adjusted R^2	0.086		
F for change in R^2	3.41****		
n	722		

Note: * $p<0.05$, ** $p<0.01$, *** $p<0.001$, **** $p<0.0001$

adoption of landscape or structural mitigation measures (Table 42 and 43) but a significant proportion of the variance in adoption still remains to be explained. As well, it can be concluded that age, threat significance and priority are significant factors influencing adoption, regardless of the type of adoption activity.

5.5 Effect of Community Level Wildfire Management on Intention and Adoption

To complete the second research objective of this study and to attempt to explain more of the variation in intentions and adoption, the effect of community level wildfire management on intentions to adopt and adoption of mitigation measures was examined. ANOVA results in Chapter 4 showed that intentions and adoption of wildfire mitigation measures did not differ by community nor by community level wildfire management group. To further test this result, community level wildfire management was added to the best fit models for intention (Model C-Intent) and adoption (Model D-Adopt). In Table 44, the results indicate that the effect of community level wildfire management on intentions to adopt wildfire mitigation measures, when all other variables are controlled, is not significant. This is consistent with the ANOVA results presented in the previous chapter.

Similarly, there were no significant differences in adoption of wildfire mitigation measures between communities with low levels and communities with moderate to high levels of community wildfire management. When all of the other variables in the model are controlled, the effect of community level wildfire management on adoption is also not significant (Table 45). It should be noted that despite not being significant, respondents in the moderate to high community level wildfire management group on average had higher levels of adoption

Table 44. *Ordinary Least Squares Regression of the effect of community level wildfire management on intention, when all other variables are controlled*

	Intention		
	Unstandardized Coefficients		Standardized Coefficients
	Beta	Std. Error	Beta
Community Level Wildfire Management			
Moderate to High	-0.02	(0.47)	-0.001
(Low)			
Gender			
Male	0.39	(0.47)	0.03
(Female)			
Education			
Less than high school	1.56	(0.90)	0.07
High school	0.95	(0.68)	0.06
Some post-secondary	1.70*	(0.73)	0.09
College or trades	1.08	(0.56)	0.09
(University)			
Age	0.03	(0.02)	-0.07
Income	-0.02*	(0.01)	-0.08
Knowledge	-0.04	(0.16)	-0.01
Direct Experience			
Yes	1.00	(0.58)	0.06
(No)			
Indirect Experience			
Yes	-0.05	(1.02)	-0.002
(No)			
Wildfire risk perception to property	-0.22	(0.14)	-0.06
Critical Awareness	-0.01	(0.24)	-0.001
Hazard Anxiety	0.14	(0.13)	0.05
Acceptability of wildfire impacts to property	0.32*	(0.14)	0.08
Controllability of wildfire impacts to property	0.20**	(0.14)	0.10
Outcome Expectancy	0.39	(0.22)	0.07
Self-efficacy	0.03	(0.25)	0.004
Response efficacy	0.55*	(0.24)	0.09
Problem-focused coping	0.31	(0.23)	0.05
Self-reliant	0.31	(0.23)	0.05
Threat significance	0.78****	(0.20)	0.16
Social approval	0.09	(0.20)	0.02
Priority	1.50****	(0.26)	0.23
Connection to nature	0.11	(0.20)	0.02
FireSmart Awareness	0.56	(0.47)	0.04
Constant	0.1947		
Adjusted R^2	0.1914		
F value	7.44****		
n	694		

Note: * $p<0.05$, ** $p<0.01$, *** $p<0.0001$

Table 45. *Ordinary Least Squares Regression of the effect of community level wildfire management on adoption, when all other variables are controlled*

	Adoption		
	Unstandardized Coefficients		Standardized Coefficients
	Beta	Std. Error	Beta
Community Level Wildfire Management			
Moderate to High	-0.35	(0.21)	-0.07
(Low)			
Gender			
Male	0.21	(0.21)	0.04
(Female)			
Education			
Less than high school	0.28	(0.41)	0.03
High school	0.06	(0.31)	0.01
Some post-secondary	0.30	(0.33)	0.04
College or trades	0.40	(0.25)	0.07
(University)			
Age	0.03***	(0.01)	0.14
Income	0.003	(0.004)	0.03
Knowledge	-0.04	(0.07)	-0.02
Direct Experience			
Yes	0.53	(0.27)	0.07
(No)			
Indirect Experience			
Yes	-0.57	(0.47)	-0.04
(No)			
Wildfire Risk Perception to property	0.03	(0.07)	0.02
Critical Awareness	0.002	(0.11)	0.001
Hazard Anxiety	-0.04	(0.06)	-0.03
Acceptability of wildfire impacts to property	0.19**	(0.07)	0.10
Controllability of wildfire impacts to property	0.13*	(0.06)	0.07
Outcome Expectancy	0.14	(0.10)	0.05
Self-efficacy	0.04	(0.12)	0.01
Response efficacy	0.21	(0.11)	0.07
Problem-focused coping	0.18	(0.11)	0.06
Self-reliant	0.14	(0.10)	0.05
Threat significance	0.52****	(0.09)	0.23
Social approval	-0.16	(0.09)	-0.06
Priority	0.42***	(0.12)	0.15
Connection to nature	-0.01	(0.09)	-0.005
FireSmart Awareness	0.04	(0.21)	0.01
Sense of Community	0.14	(0.09)	0.05
Timing of Hazard Event	-0.01	(0.09)	-0.004
Perceived Responsibility	0.10	(0.13)	0.03
Constant	0.70		
Adjusted R^2	0.1584		
F value	5.68****		
n	724		

Note: * $p<0.05$, ** $p<0.01$, *** $p<0.001$, **** $p<0.0001$

than those in the low community level wildfire management group. This is also consistent with the ANOVA results from the previous chapter.

5.6 Chapter Summary

Through factor analysis and OLS regression, the variables in Paton's (2003) theoretical model were tested and the model was extended to include risk perception and incorporate several dimensions of risk perception. The results indicate that the variables included in the intention and adoption models only explain a small portion of the variance in intentions and adoptions. They also indicated that educational attainment, particularly higher levels of education attainment, income, outcome expectancy, controllability of wildfire impacts, threat significance, response efficacy and priority are important contributors in explaining intentions to adopt wildfire mitigation measures. Similarly, age, acceptability and controllability of wildfire impacts, threat significance, and priority are important factors explaining adoption of wildfire mitigation measures. Multiple measures of risk perception explained more variation in outcome expectancy, and the hypothesized mediating variables (response efficacy and self-efficacy) in the intention formation phase were not actually mediating variables. Finally, the results of the study indicate that community level wildfire management does not influence residential property owners' intentions to adopt wildfire mitigation measures or their adoption of wildfire mitigation measures. While Paton's (2003) model explains some of the relationships between these variables and intentions and adoption, only a few of the variables in his model were significant.

6.0 Discussion

This chapter will discuss the research results presented in Chapters 4 and 5, in regards to the study objectives as well as compare these results to those found in other human dimensions of wildfire research.

6.1 Effect of Community Level Wildfire Management

Community psychology research, which studies relationships between individuals, communities and society, has found that action taken at a broader community level can influence action taken by individual members of a community (Dalton et al., 2001). It is this basic premise that lead to this study examining the effect of community level wildfire management on property owner adoption of wildfire mitigation measures. To date, to my knowledge, no research has been published examining this relationship but it has been identified as an important area to examine (Jakes & Nelson, 2007).

Community level wildfire management includes fuel management techniques, such as prescribed burning, thinning and fireguards, as well as education programs and legislation. Differences in motivations, intentions and adoption of wildfire mitigation measures were examined between communities with higher levels of community wildfire management and communities with lower levels of community wildfire management. The results of this study concluded that the amount of community level wildfire management within a participating town did not significantly influence its residents' intentions to adopt

nor adoption of wildfire mitigation measures, when all other variables were controlled.

These findings are interesting given the potential impact that communities can have on individuals (Dalton et al., 2001; Jakes & Nelson, 2007). One potential reason for this finding is that the impact that community level mitigation could have on individual action is mediated through knowledge or awareness of community action (Dalton et al., 2001). It could be that for property owners to be influenced by community wildfire management actions, they must first be aware of these actions. Another potential reason for this finding is that this study measured community wildfire management levels based on a community's adoption of government initiated risk reduction plans (E.g. Wildland-urban interface and FireSmart Community Zone plans), which include many types of measures to manage the wildfire risk to communities. This may have influenced the results as respondents may not have been aware of these plans and they may not be the most appropriate measure of community level action. A measure that incorporates community (E.g. neighbourhood work bees), municipal (E.g. legislation) and provincial (E.g. prescribed burning), and is not necessarily based only on data from the provincial government, may be a better measure of community level action as it would include all potential activities that can occur at all levels.

Some measures, such as education programs or prescribed burning, may have more of an influence on individual actions than others (E.g. bylaws or neighbourhood work bees). These measures could be examined separately to see if different measures of community wildfire management influence property owner's decisions to adopt more than other measures. Also attitudes towards community wildfire management measures may mediate the influence on property owners. If measures are seen as effectively protecting the entire community then

individual action may be viewed as unnecessary.

The relationship between community level wildfire management and its influence in individuals is complex. The definition of community wildfire management, the management measures or policies, individual perceptions and awareness of the community wildfire management measures as well as the social and environmental context all influence the relationship between community wildfire management and individual property owners. There are other individual factors, such as a tendency towards risk taking that may impact the relationship also. Further research is required to determine if there is a relationship between community wildfire management and property owner adoption of wildfire mitigation activities in other communities in Alberta and across Canada, as well as to determine if specific community wildfire management measures and policies, such as education programs, are more influential.

6.2 Factors influencing risk perceptions, motivations, intentions and adoption of wildfire mitigation measures

6.2.1 Adoption of wildfire mitigation measures

The results of this study indicate that overall property owners in Alberta were adopting many of the wildfire mitigation measures examined in this study. As well, there was fairly high level of intention to adopt measures that they had not yet adopted. The measures most completed by property owners were those considered to be part of routine property maintenance, such as pruning and thinning trees and shrubs, removing needles, leaves and overhanging branches from the roof and gutter and keeping grass short and watered frequently. Structural measures that were often adopted were installing fire retardant roofing materials and double/thermal paned or tempered glass in windows and exterior

glass doors. These findings are consistent with recent research from Canada, the US and Australia which indicates that the same landscaping and structural activities are generally completed around the world (Brenkert-Smith, 2006; Bushnell et al., 2006; McGee & McFarlane, n.d.; McGee & McFarlane, n.d.; McGee et al., 2005; McGee, 2005).

Some of the results, though, were inconsistent with other human dimensions of wildfire research. This study found that removing shrubs, trees and fallen branches close to homes was a measure completed by the majority of property owners. A study of urban residents in Edmonton, Alberta found, in contrast, that this activity was completed by the smallest percentage of people (McGee et al., 2005). This difference may be a result of differences in preferences for landscaping between property owners in larger and smaller urban centres.

Preferences for certain landscaping measures may also differ between the US and Canada. Measures such as landscaping with fire resistant materials and vegetation were adopted by only a small proportion of property owners in this study, in line with the results of a study in Edmonton, Alberta (McGee, 2005). Interestingly, some US research, though, found this to be the most popular mitigation measure (Cortner et al., 1990; Winter & Fried, 2000). The applied implication of this finding is that landscaping with fire resistant materials and vegetation is an unpopular measure in Alberta communities and communication aimed at fostering adoption of mitigation measures should focus on the many options for fire resistant landscaping and the other benefits of this measure, such as water conservation and less maintenance.

To test factors influencing risk perceptions, motivations, intentions and adoption of wildfire mitigation measures, Paton's (2003) socio-cognitive theoretical model of adoption was utilized. Paton's (2003) model was tested and extended to include a risk perception formation phase, as well as to incorporate

several aspects of risk perception (acceptability and controllability of impacts) and other aspects identified in the literature as influencing adoption.

6.2.2. Factors influencing risk perception

Two factors were found to significantly influence risk perceptions: gender and direct experience. Males had, on average, lower perceptions of the risk from wildfires than females, while those with direct experience with wildfires had higher risk perceptions than those without direct experience. These results are consistent with other risk literature which indicates that males have lower perceptions of risk than females (Davidson & Freudenburg, 1996; Kirschenbaum, 2006) and that experience is significantly related to risk perceptions (Bushnell et al., 2006; McGee et al., 2005; Tversky & Kahneman, 1974). The factors examined, though, only explained two percent of the variance in wildfire risk perceptions. Other factors, such as length of residence, and trust in wildfire management agencies may explain more of the variance. Future research should incorporate a more comprehensive set of factors that influence risk perceptions, including length of residence, trust in wildfire management agencies to reduce the risk, environmental conditions (E.g. weather and vegetation) and other factors identified in risk and human dimensions of wildfire literature (McDaniels et al., 1995; McDaniels et al., 1997; McGee et al., 2005).

6.2.3. Factors influencing motivations

The motivation formation phase of the model was tested to examine factors that influence outcome expectancy (perceptions of whether personal action will effectively mitigate wildfire risk or impacts). Risk perception, hazard anxiety and controllability of wildfire impacts significantly influenced outcome expectancy. Interestingly, controllability of wildfire impacts was found to be significant but it was not one of Paton's (2003) original variables. It makes sense that it would be a significant motivation formation variable as the more

controllable impacts are perceived to be than personal actions to reduce the risk will be perceived to be more effective. These variables, though, only explained approximately 7 percent of the variance in outcome expectancy.

A study by Paton et al. (2005) explained approximately 66 percent of the variance in outcome expectancy with risk perception, critical awareness and hazard anxiety. This difference may be because in Paton et al.'s (2005) study, factor analysis revealed that hazard anxiety could be separated into two different factors, while this study had only one factor for hazard anxiety. Also, Paton et al. (2005) studied homeowners in New Zealand and there may be cultural differences in perceptions of risk, hazard anxiety, critical awareness, outcome expectancy, and geographic differences that explain the difference in findings. Also, if the additional factor of perceived controllability was significant, then potentially trust in wildfire management agencies to effectively reduce the risk and perceived responsibility for reducing the risk may also be factors that explain some of the variance in outcome expectancy and contribute to motivation formation. Future research could incorporate factors such as these and try to explain more of the variance in outcome expectancy and motivation formation.

6.2.4. Factors influencing intentions

In the intention formation phase, the mediating relationships outlined by Paton (2003) were not found to be mediating but rather the variables outcome expectancy and response efficacy had direct influence on intentions to adopt wildfire mitigation activities. The additional variables of threat significance, priority and FireSmart awareness also significantly influenced intentions. This was interesting because FireSmart awareness was not significantly related to adoption of mitigation measures, which suggests that the effect of FireSmart awareness on adoption may be mediated through intentions to adopt. As well, FireSmart awareness was negatively associated with intentions, which may be a result of

respondents indicating that they had heard of the term but not actually knowing what FireSmart entails (Please refer to the next section for further discussion of this variable). It was also interesting that threat significance and priorities, significantly influenced both intentions and adoption. Given this fact and that they were not part of Paton's (2003) original model, future research should examine where threat significance and priorities fit in the socio-cognitive theoretical adoption decision-making process.

Only 15 percent of the variance in intentions to adopt wildfire mitigation measures were explained by the variables tested in this study (outcome expectancy, self-efficacy, response efficacy, problem-focused coping, self-reliant, threat significance, social approval, priority, connection to nature and FireSmart awareness). Other studies that examined intentions explained approximately 20 percent of the variance, in one study (Paton et al., 2006),and 67 percent, in another study (Paton et al., 2005). Paton et al. (2005) found that outcome expectancy, critical awareness and action coping (same variable as problem-focused coping in this study) significantly influenced intentions and explained approximately 67 percent of the variance while Paton et al. (2006) found that the same variables as well as sense of community influenced intentions and explained approximately 20 percent of the variance. Again, the differences in variance explained may be a result of cultural and geographic differences between New Zealand (Paton et al., 2005), Australia (Paton et al., 2006) and Canada (this study). Future research could examine these differences and attempt to explain more of the variance in intentions to adopt wildfire mitigation activities.

6.2.5. Factors influencing adoption

Only six factors were found to significantly influence adoption of wildfire mitigation measures: threat significance, priorities, acceptability and controllability of the impacts from wildfires, response efficacy and age. These

factors, along with education and income were also found to significantly influence intentions to adopt mitigation measures. The results show that overall adoption of wildfire mitigation measures is greater if property owners are older, perceive the threat from wildfires to be significant enough to warrant adoption of mitigation measures, perceive there to be enough resources to implement the mitigation measures (response efficacy), find the impacts from wildfires acceptable and controllable and place a high priority on the completion of mitigation measures. Of these factors, response efficacy was the only one identified in other human dimensions of wildfire research, in addition to Paton (2003), as directly influencing adoption (Martin et al., 2008). Martin et al. (2008) found that the greater the response efficacy the greater the adoption of mitigation measures. The influence of age on adoption of hazard reduction measures is inconsistent in hazard reduction literature, with some studies finding that age significantly influences adoption and others finding that it does not (Lindell & Perry, 2000).

The lack of significance of the other factors is also interesting. Perceived responsibility, social connections and timing of hazard event were not significantly associated with adoption of mitigation measures by property owners. The results indicated a high level of responsibility was attributed to property owners for reducing the risk from wildfires to their homes and properties, as well as to municipal and provincial agencies. The higher attribution of responsibility to property owners, as well as to municipal and provincial agencies, is consistent with other Canadian (McGee & McFarlane, n.d.; McGee & McFarlane, n.d.), US (Brenkert et al., 2005; Fried et al., 1999) and Australian research (Bushnell et al., 2006). As well, despite study respondents indicating that it was likely that a wildfire would occur near their community in the next year, timing of a hazard event was not significantly associated with adoption.

Self-efficacy, outcome expectancy, problem-focused coping, critical awareness and hazard anxiety were also not significantly associated with adoption of wildfire mitigation measures. This finding is to be expected because Paton's (2003) model identifies these factors as mediating and moderating variables contributing to motivation and intention formation not adoption. Except for age, demographic variables were not found to significantly influence adoption, which is consistent with other research (McCaffrey, 2008; McGee, 2005).

This study found that knowledge and experience with wildfires, connection to nature, and social approval of mitigation measures did not significantly influence adoption, despite other studies identifying them as factors that influence adoption (Beringer, 2000; Brenkert et al., 2005; Brenkert-Smith et al., 2006; Brenkert-Smith, 2006; Martin et al., 2008; McCaffrey, 2002; McCaffrey, 2004; Zaksek & Arvai, 2004). Self-reliance and FireSmart awareness were also examined and neither factor was found to significantly influence adoption. Of particular interest is that awareness of FireSmart was not significant. It was hypothesized that awareness of FireSmart would positively influence the adoption of wildfire mitigation measures. This finding may be a result of how awareness of FireSmart was measured: respondents indicated if they had heard of the term FireSmart. Hearing and understanding of that term are two different concepts and respondents may have heard of the term but not been familiar with the recommended mitigation activities. This was also found in a study in Hinton (McFarlane et al., 2007b). Additionally, the activities that respondents completed most frequently are related to routine property maintenance and as a result, respondents may be adopting the FireSmart mitigation measures independent of their knowledge of FireSmart. Further detailed research into the relationship between awareness of FireSmart and adoption of wildfire mitigation measures, potentially differentiating between hearing about and understanding, may be

required as this finding has applied implications in terms of the communication of wildfire mitigation measures and the FireSmart program.

Risk perception was not significantly associated with adoption of wildfire mitigation measures, which is consistent with other research (Paton, 2003; Paton et al., 2006; Paton et al., 2005). This finding may be a result of the complexity of risk and the way people negotiate risk perceptions (Slovic, 1987). Human dimensions of wildfire literature has found that risk perceptions have been influenced by attitudes about wildfire management agencies, environmental surroundings, fuel loads, weather, risk reduction activities, proximity to forested areas, and spatial extent, or size of a wildfire event (McCaffrey, 2004; McCaffrey, 2008; McGee et al., 2005).

While general risk perception was not significantly associated with adoption, this study incorporated a more comprehensive set of risk perception indicators (acceptability and controllability of impacts) in addition to the general risk dimension used by Paton. The acceptability and controllability of wildfire impacts to properties were found to be significantly associated with adoption. This is an interesting finding, as acceptability and controllability of impacts were found to be dimensions of risk perception (McDaniels et al., 1997). Consistent with the hazard risk perception literature, the publics' conception of wildfire risk appears to be more complex that an assessment of probabilities of an event. These results support McCaffrey's (2008: p 22) conclusion that perceived wildfire risk "is a multidimensional concept and those working to effect changes need to incorporate this complexity into their risk communication messages". Future studies should use multiple measures of risk perception and factor analysis to obtain the best possible measure of risk perception

Overall, the implications of these findings, particularly that age, perceived acceptability and controllability, threat significance, priorities and response

efficacy influence adoption, are that communications programs could emphasize the significance of the threat from wildfires and the controllability of their impacts in order to encourage adoption. Martin et al. (2008) noted that over simplifying the threat or severity of a risk can actually reduce the adoption of mitigation measures. On the other hand, emphasis on the controllability of the impacts through wildfire mitigation measures may increase adoption. Stressing the adoption of mitigation measures as an important priority, particularly in the spring time when yard work begins to be a more prominent activity may also increase adoption. Also, increasing perceptions of the availability of resources (response efficacy), such as time, money, and physical assistance, could also increase adoption. Martin et al. (2008) noted that to increase the availability of resources specific information on how each mitigation measure will decrease the wildfire risk, as well as the benefits and costs of each measure is necessary. Financial assistance through individual grants to help property owners reduce some of the cost of implementing the most costly mitigation activities, and physical assistance with completing some of the activities that require physical skills by government agencies would also increase resources available to property owners, which should encourage mitigation activities.

6.3 Wildfire Policy, Fuel Management and Suppression Preferences

The literature on wildfire management preferences has focused primarily on the acceptability of and preferences for certain policies. Research findings have indicated that preferences and acceptability for wildfire management measures, such as education programs, bylaws and legislation, prescribed burning, vegetation thinning and other fuel management techniques, vary within regions and countries, such as the US, Canada and Australia (E.g. Bushnell et al., 2006; Loomis et al., 2001; McGee, 2007; Ryan et al., 2006). The results presented

here indicate that all risk reduction policies (education programs, bylaws, neighbourhood work bees, reduced insurance premiums, free hazard assessments, and restrictions on new construction in high risk areas) as well as fuel reduction measures (prescribed burning, thinning and fireguards) were moderately supported ($M > 3.50$). Support for fuel reduction measures varied by community but support for education, bylaws, reduced insurance premiums and other policies were consistent across all communities.

6.3.1. Wildfire Policy Preferences

Education, in particular, was highly supported. Many respondents commented that they would like to receive more information about wildfire mitigation on their properties. This finding is consistent with other Canadian research (McGee, 2007; McGee & McFarlane, n.d.; McGee & McFarlane, n.d.). High levels of support for education as a wildfire management tool were found in studies in Edmonton (McGee, 2007), Peace River (McGee & McFarlane, n.d.) and Whitecourt, Alberta (McGee & McFarlane, n.d.). McGee (2007) attributed this high level of support to the widespread use of education in Canada to encourage adoption of wildfire mitigation measures. Similar levels of support for education as a management tool have also been found elsewhere (Cortner et al., 1990; Winter & Fried, 2000).

A requirement for property owners to remove flammable vegetation close to their houses and restrictions on where houses can be built received moderate levels of support from study respondents. Bylaws requiring new houses to be built with fire retardant building materials were also moderately supported. These findings are fairly consistent with those presented by McGee (2007), who found that urban residents in Edmonton, Alberta had strong levels of support for mandatory regulations and restrictions on where people can build their homes. These findings differ, though, from US research that found little support for

regulations that require the mandatory removal of vegetation and the restriction of individual choice (Gardner et al., 1987; Ryan et al., 2006; Winter & Fried, 2000). US research found that both urban and rural property owners were less supportive of regulations governing where and how they live on their properties and McGee (2007) hypothesized that perhaps Canadians may more willing than their US counterparts to accept restrictions on property uses. This study supports McGee's (2007) hypothesis, as the results support the idea that the views of Albertans also differ from US residents. Overall, the results from this study show that education is the most popular tool for encouraging adoption of wildfire mitigation measures and that mandatory regulations, measures that restrict individual choice and require considerable effort on behalf of the property owner are less popular. These results are supported by the literature, which has found that people are more open to voluntary efforts to reduce the risk from wildfires than mandatory regulations (McGee, 2007; Ryan et al., 2006) and that they are reluctant to support mitigation if they have to carry the burden (Cortner et al., 1990, Winter & Fried, 2000).

6.3.2. Fuel Management Preferences

In terms of fuel management measures near communities, prescribed burning, fireguards and thinning were all well supported but fireguards received the greatest amount of support by respondents in all communities. Levels of support differed among the communities, which may be because prescribed burning often is negatively associated with smoke and health concerns and thinning was not perceived to be a very effective fuel management measure. Prescribed burning was the second most preferred management technique for four of the communities (Edson, High Level, Peace River and Whitecourt) while thinning was the second most preferred for the other two communities (Grande Cache and Hinton).

The moderate to low level of support for prescribed burning may be a

result of the potential impacts on residents from smoke and the potential for prescribed burns to escape their planned boundaries (Ryan et al., 2006; Winter et al., 2002). This may particularly the case for Hinton and Grande Cache respondents who would have experienced the impacts from prescribed burns in Jasper National Park and the Wilmore Wilderness Park (McFarlane et al., 2007b).

These results from other Canadian research show differences between communities as well. A different study in Whitecourt, Alberta found that study participants had considerable support for thinning while prescribed burning was least favoured (McGee & McFarlane, n.d.). A case study of residents in Peace River, Alberta found that prescribed burning was the most popular measure while thinning was least favoured (McGee & McFarlane, n.d.). Participants in a study in Banff, Alberta showed varying levels of support for prescribed burning, indicating concern about the health and economic impacts, some support for thinning and questioned the effectiveness of fireguards (McFarlane et al., 2007a). Similarly, a study in Hinton and Jasper, Alberta showed varying levels of support for prescribed burning with concerns focused on the potential of fire escaping its planned boundaries (McFarlane et al., 2007b). A study of urban residents in Edmonton, Alberta indicated a high level of support for thinning and mixed support for prescribed burning (McGee, 2007). Other research from Alberta and British Columbia found that study participants did not have strong support for fuel management and other wildfire management measures (McGee et al., 2005). Taken together the findings suggest that Canadian's preferences for wildfire management techniques vary by community.

Studies from the US and Australia have also found that preferences can vary by community and geographic regions (Winter et al., 2006). In some cases, prescribed burning was supported (Bushnell et al., 2006; Manfredo et al., 1990; Nelson et al., 2004; Toman et al., 2004; Wagner et al., 1998; Winter et al., 2006;

Manfredo et al., 1990; Winter et al., 2006). Other studies found that there was strong support for fireguards and that there was suspicion of and less support for prescribed fire (Winter & Fried, 2000) because of the concern that prescribed fire could escape (Ryan et al., 2006). Winter et al. (2006) in particular found that preferences for fuel management measures varied by state with residents of Florida preferring prescribed burning while residents of California and Missouri preferred mechanical fuel reduction (thinning and fireguards).

The variation in preferences from this study and other research on wildfire management measures further supports the literature's findings that wildfire fuel management preferences vary. It is important to understand and test these differing preferences for wildfire management measures, as public acceptance of these measures is essential to the overall success of wildfire management strategies (Brunson & Shindler, 2004).

6.2.3. Wildfire Suppression Preferences

Preferences for wildfire suppression options, such as letting wildfires burn unless human safety and public and private structures are in danger, fighting wildfires if they are likely to be intense and spread very quickly, fighting wildfires if the fire is likely to burn large areas of land and immediate fire suppression as soon as a fire starts, regardless of the cost, were examined by community. There are many ecological benefits of allowing fires to burn and many provinces have "let it burn" policies in certain remote regions of the province (E.g. Saskatchewan) but there has not been much research in Canada into public preferences for wildfire suppression options.

This study found that all communities had moderate support for letting fires burn out naturally, unless human safety and public and private structures were in danger, but there were statistically significant differences in preferences by community. Some communities (Grande Cache) showed higher levels of

support for letting fires burn out naturally, while others (Whitecourt) showed strong preferences for immediate suppression. These results may be influenced by attitudes towards or experiences with wildfires.

The results are similar to research findings from Banff, Jasper and Hinton, Alberta where study participants indicated that they were not opposed to letting wildfires burn out naturally but that protection of human life and public and private structures was very important (McFarlane et al., 2007b). These studies indicated that under certain conditions, letting wildfires burn was appropriate. Conditions included monitoring of the fire, if the fire ignites naturally (lightening), or is in a remote area, if it can be used to achieve other objectives (E.g. managing mountain pine beetle or creating fire breaks), and if conditions are not dry (McFarlane et al., 2007b; McFarlane et al., 2007a). Taken together, the findings from these two studies and this research suggest that while respondents from Alberta were generally supportive of letting wildfires burn out, this support is dependent on certain conditions, particularly the protection of human life and public and private property. With little research on preferences for wildfire suppression in Canada, future research should further examine preferences and the factors influencing these preferences.

Overall, the results of this study, particularly in terms of wildfire policy, fuel management and suppression, further support the conclusions of Brunson and Shindler (2004), McGee (2007) and McGee et al. (2005): specific research should be conducted into the preferences of those residing (and other stakeholders) in a certain area, particularly if government agencies wish to understand citizens' preferences and conduct wildfire management that is acceptable to local citizens.

6.4 Chapter Summary

This chapter discussed the results in relation to the research objectives and other human dimensions of literature findings. Many factors were examined in relation to adoption of wildfire mitigation measures but only a few (age, perceived acceptability and controllability of wildfire impacts, priority, threat significance and response efficacy) were found to significantly influence adoption. Of these, only response efficacy supports the findings from existing literature. Interestingly, community level wildfire management was not found to influence adoption of mitigation measures, despite community psychology research indicating that community action can impact individual actions (Dalton et al., 2001). Albertan's fuel management, suppression and wildfire policy preferences were presented and analyzed in regards to findings from other human dimensions of wildfire research. Variance in preferences was apparent between communities. The final chapter discusses further the theoretical, methodological and management implications of this research.

7.0 Conclusion

Using a quantitative research questionnaire and statistical analysis, this study has examined (1) Alberta wildland-urban interface property owner's motivations, intentions to adopt and adoption wildfire mitigation measures among communities with lower and higher levels of community wildfire management, (2) the influence of demographics, social and psychological factors on risk perceptions, motivations, intentions and adoption, as well as (3) examined Alberta wildland-urban interface property owners' wildfire policy, fuel management and suppression preferences. In doing so, I employed a relatively recent theoretical model, and explored the strength of the relationships in this model, as well as other relationships relating to risk perception, motivations and intentions to adopt and adoption of wildfire mitigation measures as identified by human dimensions of wildfire literature. This chapter will discuss the theoretical, methodological and management implications of these research results.

7.1 Study Implications

7.1.1 Theoretical Implications

The primary theoretical contribution of this research is contributing to human dimensions of wildfire literature in Canada and to knowledge of Canadian wildland-urban interface property owner adoption of wildfire mitigation activities. This research helps to reduce some of the existing gap by (1) identifying factors influencing property owner intentions and adoption of wildfire mitigation

measures, and (2) identifying wildfire policy, suppression and fuel management preferences, and (3) confirming other Canadian research findings; particularly that there is a moderate level of adoption of wildfire mitigation measures by property owners and that the most popular mitigation measures are those considered part of normal property maintenance.

The finding that community level wildfire management does not influence intentions to adopt or adoption of wildfire mitigation measures by residential property owners is interesting and highlights a need for future research. Human dimensions of wildfire literature has identified social and environmental context as influencing decisions to adopt wildfire mitigation measures (McFarlane, 2006; McGee et al., 2005). Community wildfire management is part of a communities' social and environmental context; thus, this relationship between community wildfire management and individual adoption of wildfire mitigation measures should be examined further. More research is required to identify the reasons community wildfire management does not influence individual decisions to adopt wildfire mitigation measures (E.g. the social and environmental context). Also, future research should address awareness of community level wildfire management and perceived effectiveness of community level action.

This current study also further adds to Paton's (2003) theoretical framework by adding demographics to the risk perception phase, using multiple dimensions of risk, of which two were significant, and suggesting that the model may be enhanced by using multiple dimension of risk. Future studies employing this model should use multiple dimensions of risk perception and factor analysis to obtain the best possible measure of risk perception. As well, this study found that not all of the relationships outlined in Paton's (2003) model were significant and that the mediating variables in the intention formation phase did not act as

mediating variables but rather had a direct, significant relationship with intention.

7.1.2 Methodological Implications

Methodologically, this study contributed to human dimensions of wildfire literature through the development of its survey instrument. The survey questionnaire (Appendix B) used Dillman's (2007) Tailored Design Method, which clearly outlines many principles and suggestions for designing surveys and is supported by other research methods literature (E.g. Fowler Jr., 1995; McNeish, 2000; Neuman, 2000). The specific questions were developed based upon literature on risk perception, natural hazards, and human dimensions of wildfires from around the world and extensive consultation with colleagues from Alberta Sustainable Resource Development and other relevant organizations. The resulting questionnaire was a very good tool for collecting data from study participants and will provide other researchers with a tool to study participation in wildfire mitigation in other provinces in Canada and elsewhere. Already questions from the survey instrument have been utilized in research by Parks Canada and will be utilized in a study examining differences in adoption of wildfire mitigation measures between Canada and Australia.

7.1.3 Management Implications

(i) Wildfire Management Policies

One of the primary management implications is that there is a need for community specific planning in terms of wildfire management. Preferences for fuel management measures, such as prescribed burning, thinning and fireguards, differed by community. This finding, along with research showing that community support and acceptance for wildfire management measures is critical to the success of these measures (Brunson & Shindler, 2004; Shindler & Toman, 2003), indicates that wildfire management agencies need to understand the specific preferences of each community when creating wildfire management plans if

management agencies are to gain public acceptance of wildfire fuel management measures and policies.

In terms of wildfire policies and legislation at a community level, this study found that people preferred policies that did not require considerable work by them and that did not restrict their personal autonomy. Bylaws requiring property owners to remove shrubs, trees and dead branches close to their homes and restrictions on where houses can be built are were not the most popular risk reduction measures. Managers should focus on measures that do not restrict personal autonomy and physically assist property owners in completing wildfire mitigation on their properties by providing resources and financial assistance. While restrictions on personal autonomy, such as bylaws, were generally less supported, there was moderate support for bylaws pertaining to new construction. Municipal governments could encourage the adoption of some of the less completed structural measures. Research in the USA showed that despite lower levels of support the municipal governments in Florida still implement bylaws requiring property owners to complete mitigation measures (Jakes & Nelson, 2007). Bylaws could be employed to address some of the less completed measures, such as requiring new construction to use double or thermal paned glass for windows and exterior glass and fire retardant siding and roofing materials.

Neighbourhood work bees were also not very popular. This measure, though, has been successful in other communities (McFarlane et al., 2007a) and could be encouraged by highlighting the benefits of neighbourhood work bees, such as social connections, community spirit and perhaps offering tangible rewards such as a neighbourhood barbeque or funding for maintenance of a neighbourhood park.

Also, with multiple factors known to influence preferences for fuel management (prescribed burning, thinning and fireguards), and differences in

preferences in Alberta apparent, management strategies should be tailored to the local community (McGee et al., 2005). If government agencies want to conduct fuel management that is supported and considered acceptable by local citizens, communities should be surveyed to determine the appropriate supported fuel management measures.

(ii) Public Education

Public education programs, which this study found to be supported by many participants, also must be tailored and detailed, targeting a specific audience and providing information about wildfire mitigation activities and the multiple benefits of these activities, because the results of this study and others show that knowledge of wildfire mitigation activities does not necessarily translate into the adoption of these measures (Brunson & Shindler, 2004a; McGee et al., 2005; Monroe et al., 2003; Monroe & Nelson, 2004;). For example, this study found that knowledge of the FireSmart program was not significantly related to adoption of wildfire mitigation measures. While respondents may have heard of the FireSmart term and the recommended wildfire mitigation measures, they are not necessarily doing them to reduce the risk to their properties from wildfires and more communication about the activities and their multiple benefits is required to encourage individuals to actually adopt the recommended measures. For example, communication aimed at fostering adoption of mitigation measures should focus on the many options for fire resistant landscaping and the other benefits of this measure, such as water conservation and less maintenance (Brenkert et al., 2005; Brenkert-Smith et al., 2006; Bright & Burtz, 2006; McGee, 2005; Monroe et al., 2003). As well, study findings suggest that communicating the risk from wildfires will not necessarily increase adoption. This does not mean that government agencies should stop informing property owners in a WUI that they are risk, though, because risk perception is part of the adoption decision making

process. They instead should not rely entirely on communicating risk to increase participation in wildfire mitigation activities.

As recommended by McGee et al. (2005), public education programs should include interactions with fire agency personnel. While very few respondents had had a wildfire hazard assessment[1] completed on their property, of those who had, almost all had completed some of the wildfire mitigation measures recommended to them from that hazard assessment. This finding suggests that a government focus on individual property assessments and personnel interaction with property owners will increase adoption of wildfire mitigation measures.

Study respondents indicated that the responsibility for reducing the risk from wildfires should be shared amongst property owners, and the municipal, provincial and federal governments. Messages communicated to the public should encourage property owners to help reduce the risk alongside the government, stressing that it is not solely property owner's responsibility but that they are working in collaboration with the government and that FireSmart and other government programs are part of a larger plan to reduce the risk from wildfires to individual properties and entire communities.

Since the most popular mitigation measures are those that are part of routine property maintenance, unpopular measures, such as landscaping with fire resistant materials and vegetation should be encouraged by focusing on other benefits to these measures. For example, from a landscaping perspective, fire resistant materials and vegetation are often easier to maintain.

(iii) Incentives

McGee et al. (2005) noted that financial incentives may encourage adoption of wildfire mitigation measures by some people. Financial constraints were identified by many respondents in this study as why they were unable to

1. It should be noted that Alberta Sustainable Resource Development has conducted wildfire hazard assessments in communities but this is not a largely promoted program.

complete some of the recommended mitigation measures. While the provincial government provides FireSmart community grants, personal grants to help property owners in particularly high risk areas to complete the wildfire mitigation measures may encourage more adoption of the recommended measures. Municipal governments could also provide financial incentives, perhaps in terms of tax rebates for FireSmart properties. Also, respondents supported reduced insurance premiums for properties that had completed the recommended wildfire mitigation measures. Despite this result, governments in Alberta and across Canada must not rely solely on the insurance industry to encourage wildfire mitigation. Insurance payouts from wildfire events in Canada have been minimal compared to other hazards, such as hail and flooding. Until payouts from wildfires increase, the insurance industry will not actively encourage property owner wildfire mitigation through reduced insurance premiums. Consequently, governments cannot depend on the insurance industry to solely drive property owner wildfire mitigation in Canada. Instead, if financial incentives to encourage property owner mitigation are pursued, governments could work in conjunction with the insurance industry and/or with each other to offer other financial incentives to property owners, such as tax rebates or personal grant opportunities.

7.2 Future Research Suggestions

This study provided human dimensions of wildfires researchers with more information about the adoption of wildfire mitigation activities by property owners in Alberta, Canada, and Albertan's wildfire management preferences, but more research is required. Future research is necessary to examine the effect of community, including community wildfire management levels, on individual adoption of wildfire mitigation. Specifically, future research could examine the best measure of community wildfire management, whether it is to use a holistic measure or examining different measures and policies separately to determine if

the different measures result in different results.

Also, not all of the variation in intentions and adoption of wildfire mitigation activities was explained. Future research should further examine the relationship between the factors examined in this study as well as other factors (E.g. trust in management agencies) that may explain more of the variation in intentions and adoption. A longitudinal study could also better explain the relationship between intentions and adoption and perhaps explain more of the variance in adoption. As well, models, such as Paton's (2003) that attempt to explain individual's decisions to adopt wildfire mitigation activities require further testing. Similarly, this study found that wildfire management preferences varied by community. Modeling could be completed to try and explain preferences for wildfire management measures.

7.3 Chapter Summary

In conclusion, with climate change forecasts, population increases in wildland urban interfaces and the changing pattern of wildfire occurrences in Canada, there is a great need to effectively manage the risk from wildfires in Canada. This study aimed to help meet this need by increasing the knowledge of residential wildfire mitigation and management preferences in Alberta. This study examined the adoption of mitigation measures among communities with lower and higher levels of community wildfire management, identified factors influencing wildfire risk perceptions, motivations, intentions and adoption of wildfire mitigation measures as well as preferences for wildfire policy, fuel management and suppression measures. The theoretical, methodological and management implications of these results encourage further research into property owner participation in wildfire mitigation, factors influencing adoption, theoretical models for research. As well, they encourage fire management agencies in Canada to understand the complexity of human dimensions of wildfires and incorporate

research findings into wildfire risk reduction policy and public education programs.

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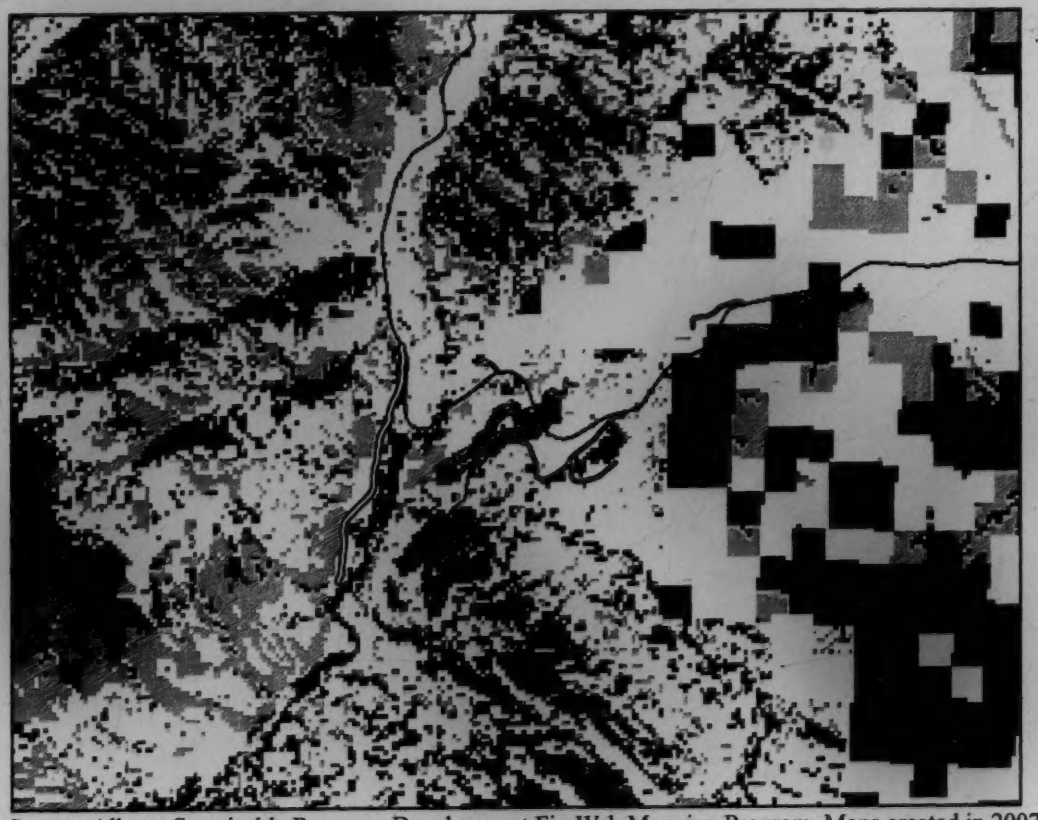
APPENDIX A

Overall Wildfire Threat Potential Maps for Study Communities

Wildfire Threat Potential (All Seasons) Edson, Alberta

Source: Alberta Sustainable Resource Development FireWeb Mapping Program. Maps created in 2007.

Wildfire Threat Potential (All Seasons) Grande Cache, Alberta



Map Legend

Paved Roads

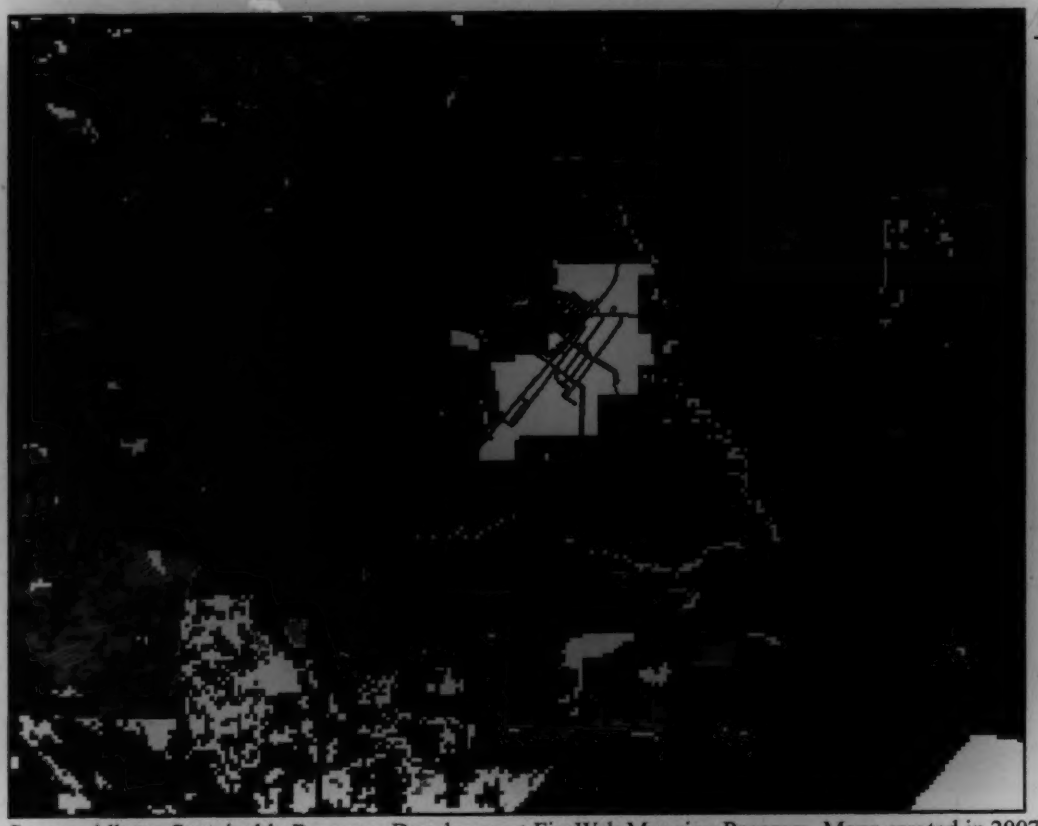
- Undivided 1L Road
- Undivided 2L Road
- Undivided 4L Road
- Divided Road

Wildfire Threat Potential

- Non-Fuel
- Low Wildfire Threat Potential
- Moderate Wildfire Threat Potential
- High Wildfire Threat Potential
- Very High Wildfire Threat Potential
- Extreme Wildfire Threat Potential
- (White) No Data Available

Source: Alberta Sustainable Resource Development FireWeb Mapping Program. Maps created in 2007.

Wildfire Threat Potential (All Seasons) High Level, Alberta



Source: Alberta Sustainable Resource Development FireWeb Mapping Program. Maps created in 2007.

Wildfire Threat Potential (All Seasons) Hinton, Alberta

Map Legend

Paved Roads

Undivided 1L Road

Undivided 2L Road

Undivided 4L Road

Divided Road

Wildfire Threat Potential

Non-Fuel

Low Wildfire Threat Potential

Moderate Wildfire Threat Potential

High Wildfire Threat Potential

Very High Wildfire Threat Potential

Extreme Wildfire Threat Potential

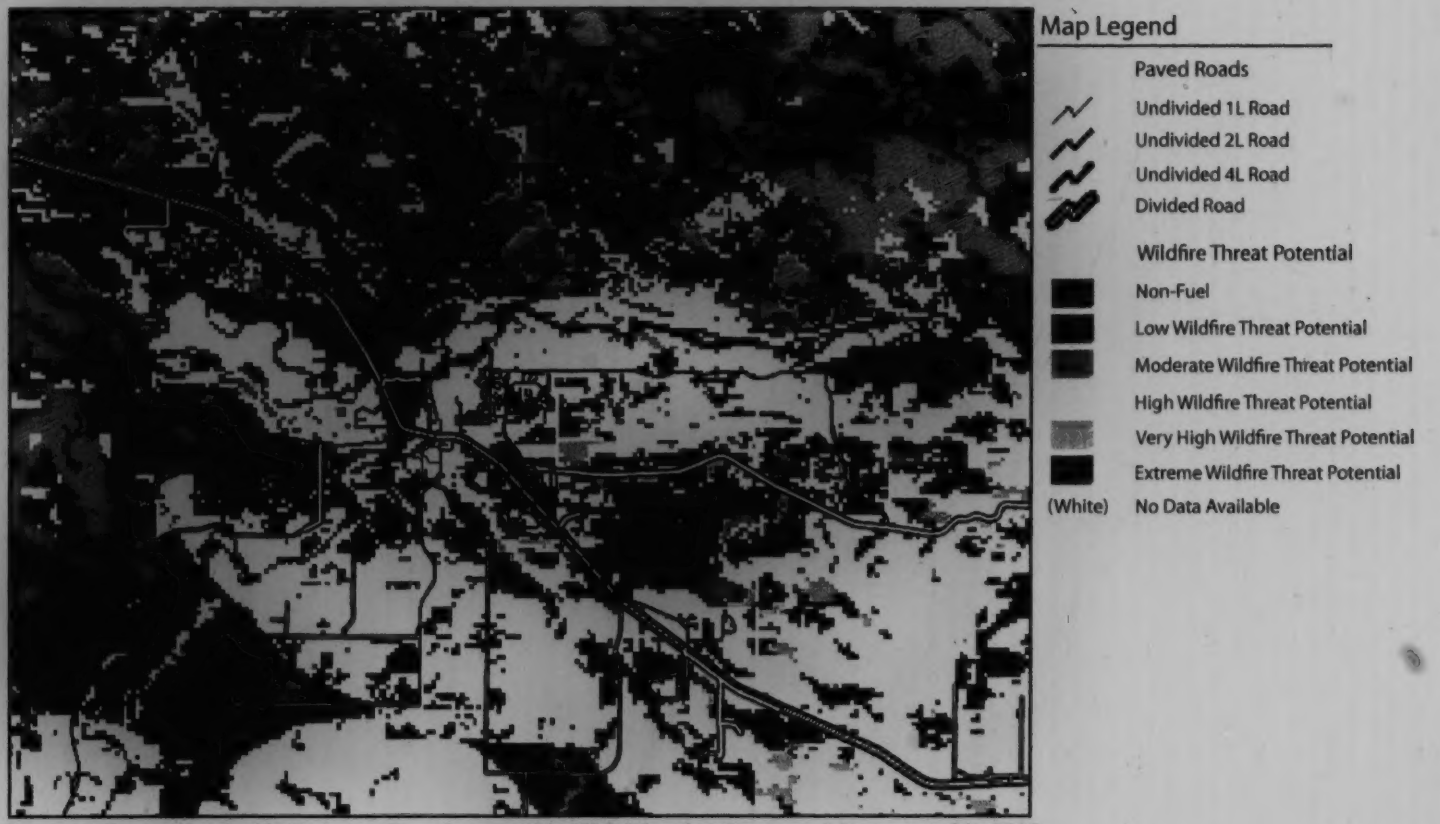
(White) No Data Available

Source: Alberta Sustainable Resource Development FireWeb Mapping Program. Maps created in 2007.

Wildfire Threat Potential (All Seasons) Peace River, Alberta

Source: Alberta Sustainable Resource Development FireWeb Mapping Program. Maps created in 2007.

Wildfire Threat Potential (All Seasons) Whitecourt, Alberta



Source: Alberta Sustainable Resource Development FireWeb Mapping Program. Maps created in 2007.

APPENDIX B

Study Questionnaire, Cover Letters and Reminder Postcard

YOU, YOUR PROPERTY AND WILDFIRES

Each year wildfires impact woodlands, properties and homes. This survey is being conducted by researchers at the University of Alberta to help us understand how Albertans view wildfires and the impacts wildfires have on property and communities. All of your responses will be kept confidential and only a summary of everyone's answers will be used in reports and presentations. The information provided will be used to determine Albertans' expectations for managing and reducing the potential impacts of wildfires and also help wildfire management agencies protect Albertans and their communities from wildfires.

Please try to answer all of the questions. If there are any questions you do not wish to answer, please leave them blank and move to the next one.

Please return your completed questionnaire in the postage paid envelope provided. Thank you for taking the time to complete this questionnaire.

If you have any questions regarding this survey please contact: **Hilary Flanagan** by phone at (780) 492-5879 (leave a message) or e-mail at flanagan@ualberta.ca

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UNIVERSITY OF ALBERTA

DEPARTMENT OF EARTH AND ATMOSPHERIC SCIENCES

Printed on Recycled Paper

BEFORE YOU BEGIN

In this questionnaire the term **wildfire** refers to any forest fire, grass fire or brush fire that is caused by nature (lightning) or by humans (campfires, cigarettes, etc.).

SECTION 1: WILDFIRE RISK

We would like to start by asking you some questions about how risky you feel wildfires and other hazards are to yourself, your property and your community.

1. **Wildfires and other hazards can affect people and communities in Alberta. How much of a risk do you feel each of the following could pose to you and your property in the next 5 years?** On a scale of 1 (no risk) to 7 (great risk), please circle the number that best represents your response.

	No risk						Great risk	No opinion
Wildfires	1	2	3	4	5	6	7	☐
Hail	1	2	3	4	5	6	7	☐
Climate Change	1	2	3	4	5	6	7	☐
Drought	1	2	3	4	5	6	7	☐
Tornadoes	1	2	3	4	5	6	7	☐
Mountain Pine Beetle	1	2	3	4	5	6	7	☐
Flooding	1	2	3	4	5	6	7	☐

In the next few questions we would like to get your opinion on the risk wildfires pose to your property, your community and the environment, as well as whether or not the impacts can be controlled and if the impacts are acceptable to you.

2. **On a scale of 1 (no risk) to 7 (great risk), how much of a risk do you feel wildfires could pose to each of the following in the next 5 years?** Please circle the number that best represents your response.

	No risk						Great risk	No opinion
Your property	1	2	3	4	5	6	7	☐
Your community	1	2	3	4	5	6	7	☐
The natural environment	1	2	3	4	5	6	7	☐

3. **In your opinion, how controllable are wildfires in terms of people's ability to control their impacts to each of the following?** On a scale of 1 (not at all) to 7 (very), please circle the number that best represents your response.

	Not at all controllable						Very controllable	No opinion
Your property	1	2	3	4	5	6	7	☐
Your community	1	2	3	4	5	6	7	☐
The natural environment	1	2	3	4	5	6	7	☐

4. **How acceptable are wildfires to you in terms of their general impact on each of the following?** On a scale of 1 (not at all) to 7 (completely), please circle the number that best represents your response.

	Not at all acceptable						Completely acceptable	No opinion
Your property	1	2	3	4	5	6	7	☐
Your community	1	2	3	4	5	6	7	☐
The natural environment	1	2	3	4	5	6	7	☐

5. **How much negative emotion (i.e. anger, fear) do you feel when you think about wildfires and their impact on you, your family and your property?** On a scale of 1 (none) to 7 (high), please circle the number that best represents your response.

None						High	No opinion
1	2	3	4	5	6	7	☐

6. **How likely do you think it is that a wildfire will occur near your community in the next year?**

Very unlikely	Unlikely	Not sure	Likely	Very likely	No opinion
☐	☐	☐	☐	☐	☐

SECTION 2: WILDFIRE AWARENESS

We are also interested in how familiar you are with wildfires.

7. **How often do you think and talk about wildfires?**

	Never	Rarely	A few times a year	Once a month	Once a week or more	Not sure
Think about wildfires	☐	☐	☐	☐	☐	☐
Talk about wildfires	☐	☐	☐	☐	☐	☐

8. For each of the following true or false statements, please check the box that best describes your view.

	Mostly true	Mostly false	Not sure
Wildfires burn faster going up hill.	☐	☐	☐
Houses only burn when the flames from a wildfire reach the house.	☐	☐	☐
Wildfires can be an important force in controlling outbreaks of disease and insects in forests.	☐	☐	☐
It takes decades before plants grow in a fire damaged forest.	☐	☐	☐
Wildfires usually result in the death of most animals in a burnt area.	☐	☐	☐
Wildfires help recycle minerals and nutrients needed by trees and other plants.	☐	☐	☐

9. Have you ever searched for information about wildfires, their impacts or preparing your house and property for wildfires?

☐ Yes → Where did you search for this information? (Select all that apply)

- ☐ Internet
- ☐ Neighbours
- ☐ Friends or relatives
- ☐ Town fire department
- ☐ Provincial forestry department
- ☐ Do not remember
- ☐ Other _____

☐ No

10. Have you ever heard of the term *FireSmart*?

☐ Yes → Where do you recall hearing this term? (Select all that apply)

- ☐ Radio
- ☐ Television
- ☐ Newspaper
- ☐ Internet
- ☐ Relative, friend or neighbour
- ☐ Brochures or pamphlets
- ☐ Do not remember
- ☐ Other _____

☐ No

SECTION 3: YOUR PROPERTY AND WILDFIRES

The next section asks you about activities that can be used to prepare homes and properties for wildfires.

11. In regards to your house and property, please indicate whether or not each of the following activities is done already or if you plan to do them.

	Done	Plan to do in the next year	Plan to do in the next 5 Years	Do not plan to do	Does not apply
Keep grass short and water frequently during the spring, summer and fall	☐	☐	☐	☐	☐
Remove shrubs, trees or fallen branches close to your house	☐	☐	☐	☐	☐
Thin shrubs or trees so that nearby plants and trees do not touch	☐	☐	☐	☐	☐
Store firewood well away from your house	☐	☐	☐	☐	☐
Remove needles, leaves and overhanging branches from the roof and gutters	☐	☐	☐	☐	☐
Landscape with fire resistant materials and vegetation (such as rocks, aspen, maple or poplar trees)	☐	☐	☐	☐	☐
Remove debris or needle build up under balconies and porches	☐	☐	☐	☐	☐
Prune large trees by removing all branches that are close to the ground	☐	☐	☐	☐	☐
Screen house vents, gutters and the underside of eaves with metal mesh	☐	☐	☐	☐	☐
Screen or enclose the undersides of decks and porches	☐	☐	☐	☐	☐

	Done	Plan to do in the next 5 years	Plan to do when it needs replacing	Do not plan to do	Does not apply
Install metal, asphalt, slate, tile or other fire retardant roofing materials on your roof	☐	☐	☐	☐	☐
Install double/thermal pane or tempered glass in windows and exterior glass doors	☐	☐	☐	☐	☐
Install stucco, metal, brick or other fire resistant exterior siding on your house	☐	☐	☐	☐	☐

12. Each of the following statements relates to the activities in question 11. Please indicate your level of agreement with each statement.

	Strongly disagree	Disagree	Neutral	Agree	Strongly agree	No opinion
I need more information before I can complete some of these activities.	☐	☐	☐	☐	☐	☐
If I made all or some of the suggested changes, my family or neighbours would like it.	☐	☐	☐	☐	☐	☐
It would be difficult to find the money to make some of these changes to my property.	☐	☐	☐	☐	☐	☐
Implementing these activities is a priority for me.	☐	☐	☐	☐	☐	☐
For physical reasons I am unable to complete some of the activities without assistance.	☐	☐	☐	☐	☐	☐
I do not have the skills to complete some of the recommended activities.	☐	☐	☐	☐	☐	☐
If I made these changes I would not feel as connected to nature.	☐	☐	☐	☐	☐	☐
I do not consider the threat of wildfire significant enough to warrant doing some of the activities.	☐	☐	☐	☐	☐	☐
Preparing for wildfires will significantly reduce damage to my house should a wildfire occur.	☐	☐	☐	☐	☐	☐
Wildfires are too destructive to bother preparing for.	☐	☐	☐	☐	☐	☐

13. In the event of an evacuation, do you have a plan prepared for yourself, and other members of your household (such as a safe route away from the fire, a meeting location and a place to stay)?

Done	Plan to do	Do not plan to do
☐	☐	☐

14. To what extent do you agree that each of the following are responsible for reducing wildfire risks to your house and property, well before a wildfire occurs?

	Strongly disagree	Disagree	Neutral	Agree	Strongly agree	No opinion
Myself and my household members	☐	☐	☐	☐	☐	☐
Local fire department	☐	☐	☐	☐	☐	☐
Municipal government	☐	☐	☐	☐	☐	☐
Provincial government	☐	☐	☐	☐	☐	☐
Federal government	☐	☐	☐	☐	☐	☐

15. In your opinion, how likely is it that firefighters could protect your home if it was threatened by a wildfire?

Very unlikely	Unlikely	Not sure	Likely	Very likely	No opinion
☐	☐	☐	☐	☐	☐

16. Has your property had a wildfire hazard home and site assessment done?

☐ Yes → Who conducted the assessment?
- ☐ You or someone in your household
- ☐ Local fire department
- ☐ Private contractor
- ☐ Provincial government
- ☐ Other _____

Have you completed any of the suggestions made during the assessment?
- ☐ Yes
- ☐ No

☐ No

☐ Not sure

17. The following are some ways to reduce the risk of wildfires to your community. To what extent do you favour or oppose each of the options?

	Strongly oppose	Somewhat oppose	Neutral	Somewhat favour	Strongly favour	No opinion
Educate homeowners about ways to reduce wildfire risk on their properties	☐	☐	☐	☐	☐	☐
Bylaws requiring homeowners to remove shrubs, trees and dead branches close to their house	☐	☐	☐	☐	☐	☐
Reduced insurance premiums if recommended activities are done	☐	☐	☐	☐	☐	☐
Neighbourhood work bees to help people to prepare homes and properties for wildfires	☐	☐	☐	☐	☐	☐
Free wildfire hazard assessments for residential properties	☐	☐	☐	☐	☐	☐
Bylaws requiring new houses to use fire retardant building materials	☐	☐	☐	☐	☐	☐
Restrict houses from being built in high risk areas	☐	☐	☐	☐	☐	☐

SECTION 4: HOW SHOULD WILDFIRES BE MANAGED?

Another aspect of our study is to understand Albertans' opinions on management approaches that may be used to reduce the potential impacts of wildfires.

18. Fireguards are areas of vegetation around communities that are cleared. To what extent do you favour or oppose the use of fireguards around your community as a wildfire management approach?

Strongly oppose	Somewhat oppose	Neutral	Somewhat favour	Strongly favour	No opinion
☐	☐	☐	☐	☐	☐

How effective do you feel fireguards would be at protecting your community?

Very ineffective	Ineffective	Neutral	Effective	Very effective	No opinion
☐	☐	☐	☐	☐	☐

19. Thinning is the selected removal of trees in forested areas. To what extent do you favour or oppose thinning as a wildfire management approach?

Strongly oppose	Somewhat oppose	Neutral	Somewhat favour	Strongly favour	No opinion
☐	☐	☐	☐	☐	☐

How effective do you feel thinning would be at protecting your community?

Very ineffective	Ineffective	Neutral	Effective	Very effective	No opinion
☐	☐	☐	☐	☐	☐

20. Prescribed burning is the intentional burning of vegetation under controlled conditions (such as firefighters on site to monitor the burning). To what extent do you favour or oppose the use of prescribed burning as a wildfire management approach?

Strongly oppose	Somewhat oppose	Neutral	Somewhat favour	Strongly favour	No opinion
☐	☐	☐	☐	☐	☐

How effective do you feel prescribed burning would be at protecting your community?

Very ineffective	Ineffective	Neutral	Effective	Very effective	No opinion
☐	☐	☐	☐	☐	☐

21. Are any of the above management approaches (fireguards, thinning and prescribed burning) being done in or around your community?

☐ Yes

☐ No

☐ Not sure

22. There are several approaches that can be taken once a wildfire starts. To what extent do you favour or oppose each of the following approaches?

	Strongly oppose	Somewhat oppose	Neutral	Somewhat favour	Strongly favour	No opinion
Wildfires should be allowed to burn themselves out, as long as human safety and public and private structures are not in danger.	☐	☐	☐	☐	☐	☐
Wildfires should only be fought if the fire is likely to be very intense and spread very quickly.	☐	☐	☐	☐	☐	☐
Wildfires should only be fought if the fire is likely to burn large areas of land.	☐	☐	☐	☐	☐	☐
Wildfires should be fought as soon as they start, no matter what the cost.	☐	☐	☐	☐	☐	☐

SECTION 5: YOU AND WILDFIRES

We are also interested in your personal experiences with wildfires and wildfire management.

23. Please indicate if you have experienced any of the following situations by checking all that apply.

I have read about or watched coverage of wildfires in the media (i.e. television, news).	☐
I have felt fear or anxiety because of a wildfire.	☐
I have experienced discomfort or health problems from smoke from a wildfire.	☐
I have been placed on evacuation alert because of a wildfire.	☐
I have been evacuated because of a wildfire.	☐
I have experience or training in fire management and/or as a firefighter.	☐
I have lost my house or other structures on my property because of a wildfire.	☐
Someone close to me has lost their house because of a wildfire.	☐
I have personally seen smoke or flames from a wildfire near my house.	☐
Wildfire has come close to my community.	☐
I do not have any experience with wildfires.	☐

SECTION 6: YOU AND YOUR COMMUNITY

Finally we would like to ask a few questions about you to help determine if there are connections between peoples' characteristics and their opinions. This information will be kept confidential. If there is a question you do not want to answer please leave it blank and move to the next question.

24. In regard to the issues and problems that you deal with in your everyday life, please indicate your level of agreement with each of the following statements.

	Strongly disagree	Disagree	Neutral	Agree	Strongly agree	No opinion
I have considerable control over what happens in my life.	☐	☐	☐	☐	☐	☐
I can solve most of my problems by myself.	☐	☐	☐	☐	☐	☐
I sometimes feel helpless when dealing with problems.	☐	☐	☐	☐	☐	☐
I try to come up with a strategy about what to do.	☐	☐	☐	☐	☐	☐
I think about how I might best handle the problem.	☐	☐	☐	☐	☐	☐

25. Please indicate your level of agreement with each of the following statements.

	Strongly disagree	Disagree	Neutral	Agree	Strongly agree	No opinion
I often interact with other members of my community.	☐	☐	☐	☐	☐	☐
I feel like I belong in this town.	☐	☐	☐	☐	☐	☐
Even if I had the opportunity I would not move out of this town.	☐	☐	☐	☐	☐	☐

26. Approximately how long have you lived in your town?

_____ years **OR** _____ months

27. Please indicate your gender:

Female ☐

Male ☐

28. In what year were you born? 19_____

29. Please indicate your highest level of education.

☐ Some grade school or high school education

☐ High school graduate

☐ Some post-secondary education

☐ College or trades certificate or diploma

☐ University or post-graduate certificate, diploma or degree

30. Which category best describes your total household income before tax in 2006?

☐ Less than $20,000

☐ $20,001 - $40,000

☐ $40,001 - $60,000

☐ $60,001 - $80,000

☐ $80,001 - $100,000

☐ More than $100,000

If there is any other information that you would like to provide to us concerning your views about wildfires, wildfire management, wildfire risks or preparing homes and properties for wildfires, please use the space below.

A summary of the results can be obtained by visiting our website in August, 2008
http://research.eas.ualberta.ca/hdhresearch

☐ Check this box if you would like a copy of the survey results mailed to you when the research is completed (no information will be sent to you unless you check this box).

Thank you very much for your participation!
Please return your completed survey in the enclosed postage paid envelope.

First Cover Letter

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eas.enquiries@ualberta.ca

Tel: 780.492
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ID NUMBER

Name
Address
Town, Alberta Postal Code

We are researchers at the University of Alberta. We are writing to you to ask your help with an important study about wildfires and protecting homes and properties in Alberta. This study is part of an effort to learn how Albertans feel about wildfires and reducing the potential impact of a wildfire to their homes and properties. It is sponsored by several organizations, including Alberta Sustainable Resource Development, the Canadian Forest Service, and the Social Sciences and Humanities Research Council of Canada.

Six communities in Alberta were chosen for this study: Edson, Grande Cache, High Level, Hinton, Peace River and Whitecourt. We are contacting a random sample of property owners in each town to ask their views about wildfires, how much of a risk wildfires pose, and what activities they have done or plan to do to reduce the risk.

There is little information, at this time, on resident's views of wildfires in Canada. The results of this study will help wildfire management agencies protect Albertans and their communities from potential wildfires as well as design communications plans, policies and programs aimed at reducing the wildfire risk to homeowners.

In order for the results to be representative of the opinions of property owners in Alberta, it is important that each person return their questionnaire. **Please complete the questionnaire even if you have little interest in wildfires and wildfire management.** We are interested in obtaining a wide variety of views. Please fill out the survey in regard to the property where you currently live.

All of your answers are confidential. The questionnaire has an identification number for mailing purposes only. This is so we can check your name off the mailing list when your questionnaire is returned. Your name will be deleted from the mailing list and not connected with your answers. Only a summary of all responses will appear in any reports and presentations from this study.

If you wish to see a summary of the results please visit the website listed below in August 2008 or check the box at the end of the questionnaire. If you have any questions about the survey, please cal Hilary Flanagan at 1-780-492-5879 (leave a message) or e-mail flanagan@ualberta.ca

Thank you very much for your help with this important study.

Sincerely

Hilary Flanagan
Masters Student
http://research.eas.ualberta.ca/hdhresearch

Tara McGee, PhD
Associate Professor

Second Cover Letter

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Fax: 780.492.2030

ID NUMBER

Name
Address
Town, Alberta Postal Code

We are researchers at the University of Alberta and about a month ago we sent a questionnaire to you that asked for your opinions about wildfires and protecting homes and properties in Alberta. To the best of our knowledge, it has not been returned.

We are writing again because your questionnaire is important for helping to get accurate results. Although we sent questionnaires to people living in six communities, it is only by hearing from nearly everyone in the sample that we can be sure that the results are truly representative.

A comment on our survey procedures. An identification number is printed on the questionnaire so that we can check your name off the mailing list when it is returned. Individual names will not be connected to the results in any way. Protecting confidentiality of people's answers is very important to us, as well as to the University of Alberta.

A few people have contacted us to say that they no longer own the property the questionnaire was sent to or that the questionnaire was addressed to someone who does not live there anymore. If either of these situations applies to you, please let us know so we can remove your name from the mailing list. To do this or if you have any other concerns or questions, please call Hilary Flanagan at 1-780-492-5879 (leave a message) or send an e-mail to flanagan@ualberta.ca.

We hope that you will fill out and return the questionnaire soon.

Thank you very much for your help with this study.

Sincerely

Hilary Flanagan
Masters Student
http://research.eas.ualberta.ca/hdhresearch

Tara McGee, PhD
Associate Professor

Reminder Postcard

UNIVERSITY OF ALBERTA

About a week ago, a questionnaire about wildfires and reducing the potential impact of a wildfire to your home and property was mailed to you. You were randomly selected from residential property owners in your town.

If you have already returned the questionnaire, please accept our sincere thanks. If you have not had an opportunity to complete it, please take a few minutes to fill it out today and return it. Your response is very important to the success of our study.

If you did not receive the questionnaire, or it was misplaced, please call or e-mail Hilary Flanagan at the phone number or e-mail address below and we will mail you another one right away.

Thank you for your help!

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Tara McGee, PhD
Associate Professor

http://research.eas.ualberta.ca/hdhresearch/

APPENDIX C

Complete Descriptive Statistical Results for All Variables

Table 1. Factor Analysis of Critical awareness, sense of community, problem-focused coping, response efficacy, and self-efficacy

	Factor 1 (Critical Awareness)	Factor 2 (Sense of Community)	Factor 3 (Problem-focused coping)	Factor 4 (Response efficacy)	Factor 5 (Self-efficacy)
Thinking about wildfires	**0.82**	0.05	0.02	0.03	0.02
Talking about wildfires	**0.99**	0.04	0.02	0.05	0.01
Feeling of belonging in community	0.01	**0.99**	0.07	-0.002	0.05
Interaction with other community members	0.06	**0.56**	0.17	-0.003	0.10
Would not move away from community	0.01	**0.50**	0.03	-0.01	0.07
Strategic when dealing with problems	0.02	0.14	**0.85**	0.08	0.2
Think about how to best handle problems	0.04	0.17	**0.84**	0.07	0.29
Skills to complete mitigation measures	0.02	0.02	0.01	**0.96**	0.04
Physically able to complete mitigaton measures	-0.02	-0.06	0.05	**0.55**	0.01
Money available to make changes	0.05	0.03	0.03	**0.35**	0.03
Control over what happens in life	0.04	0.13	0.18	0.05	**0.79**
Solve most problems without assistance	-0.01	0.12	0.28	0.04	**0.70**
Explained variance (%)	48%	36%	14%	10%	7%
Raw Cronbach α	0.91	0.66	0.90	0.64	0.77

Table 2. *Means and Proportions for Demographic Variables & Intention & Adoption, by Community*

		Low Community Level Wildfire Management			Moderate to High Community Level Wildfire Management		
	ANOVA *F-value*	Edson *(n = 186)*	High Level *(n = 57)*	Peace River *(n = 168)*	Grande Cache *(n= 120)*	Hinton *(n = 410)*	Whitecourt *(n = 268)*
Gender[1]							
Female		52.78	44.64	56.36	50.00	50.74	41.13
Male		47.22	55.36	43.64	50.00	49.26	58.87
Educational Attainment[2]							
Less than high school		12.85	6.12	8.75	13.76	11.68	7.45
High school		23.46	14.29	16.88	18..35	19.29	23.14
Some post-secondary		10.06	12.24	13.75	16.54	10.66	15.29
College or trades		35.75	40.82	30.00	35.78	36.04	37.25
University or greater		17.88	26.53	30.63	15.60	22.34	16.86
Age	7.50***	47.66 (14.65)bc	44.77 (10.82)bc	48.51 (12.44)ac	52.25 (12.88)a	49.14 (12.96)ac	44.55 (12.48)b
Income	5.15**	80738.26 (28713.26)ab	87358.49 (24818.65)ac	83466.67 (27757.02)ab	73883.5 (32906.08)b	78735.63 (27741.27)bc	87757.85 (25047.61)a
Length of Residence	8.57***	19.73 (16.93)ac	16.28 (12.05)bc	20.66 (15.09)ac	19.76 (12.50)ab	22.39 (14.98)a	15.37 (11.68)b
Score							
Intention	1.33	30.67 (6.21)	29.26 (6.35)	29.52 (6.10)	31.06 (6.05)	30.35 (5.75)	30.09 (6.03)
Adoption (All)	0.40	6.80 (2.98)	7.02 (3.03)	6.69 (2.78)	6.93 (2.76)	6.34 (2.94)	6.63 (2.86)
Adoption (Landscape)	0.25	5.08 (2.52)	5.47 (2.71)	5.23 (2.31)	5.17 (2.51)	5.13 (2.55)	5.18 (2.52)
Adoption (Structural)	2.95	1.72 (1.09)	1.54 (1.00)	1.46 (1.05)	1.76 (1.00)	1.51 (1.04)	1.45 (1.01)

Note: The *F* statistic is computed from a one-way analysis of variance

*** $p < 0.0001$, ** $p < 0.001$

[1] $\chi 2\ (5, 1140) = 12.08, p = 0.0337$

Table 3. *Means and Proportions for Demographic & Intention & Adoption Variables, by Community Wildfire Management Level*

		Low Community Level Wildfire Management	**Moderate to High Community Level Wildfire Management**
	t-value	Low Group *(n=411)*	High Group *(n=798)*
Gender[1]			
Female		53.12	47.40
Male		46.88	52.60
Educational Attainment[2]			
Less than high school		10.31	10.55
High school		19.59	20.45
Some post-secondary		11.86	13.06
College or trades		34.02	26.41
University or greater		24.23	19.53
Age	-0.60	47.60 (13.29)	48.09 (13.06)
Income	1.04	82897.73 (27768.08)	80979.23 (28167.24)
Length of Residence	-0.02	19.62 (15.60)	19.64 (13.93)
Score			
Intention	-0.96	29.99 (6.20)	30.36 (5.89)
Adoption (All)	0.63	6.79 (2.90)	6.68 (2.89)
Adoption (Landscape)	0.29	5.20 (2.46)	5.15 (2.53)
Adoption (Structural)	1.05	1.59 (1.07)	1.53 (1.03)

[1] χ^2 (1, 1190) = 3.4747, p = 0.0623

[2] χ^2 (4, 1146) = 3.5023, p = 0.4775

Table 4. *Completion of Landscape Wildfire Mitigation Measures, by Community*

	Low Community Level Wildfire Management			Moderate to High Community Level Wildfire Management		
	Edson	High Level	Peace River	Grande Cache	Hinton	Whitecourt
	(n = 186)	*(n = 57)*	*(n = 168)*	*(n= 120)*	*(n = 410)*	*(n = 268)*
Keep grass short and watered frequently						
Done	86.96	92.73	90.36	84.75	89.58	89.47
Plan to do in next year	1.63	1.82	0.60	4.24	1.99	2.63
Plan to do in next 5 years	0.00	0.00	0.00	1.69	0.00	1.13
Do not plan to do	5.98	3.64	5.42	4.24	4.47	4.14
Does not apply	5.43	1.82	3.61	5.08	3.97	2.63
Remove shrubs, trees or fallen branches close to your house						
Done	63.04	57.89	63.25	65.83	63.18	68.56
Plan to do in next year	6.52	10.53	3.01	0.83	5.97	3.79
Plan to do in next 5 years	1.09	1.75	0.60	2.50	1.00	0.38
Do not plan to do	9.78	15.79	17.47	10.00	12.19	12.12
Does not apply	19.57	14.04	15.66	20.83	17.66	15.15
Thin shrubs or tress so that nearby plans and trees do not touch						
Done	44.57	45.61	39.39	47.50	41.6	47.74
Plan to do in next year	4.35	7.02	8.48	4.17	9.02	6.39
Plan to do in next 5 years	0.54	1.75	1.82	2.50	2.51	1.50
Do not plan to do	19.02	24.56	24.24	12.50	16.79	17.29
Does not apply	31.52	21.05	26.06	33.33	30.08	27.07
Store firewood well away from your house						
Done	45.86	64.91	46.11	48.33	46.31	50.75
Plan to do in next year	3.87	1.75	3.59	4.17	3.94	4.51
Plan to do in next 5 years	1.66	0.00	0.00	0.83	0.25	1.13
Do not plan to do	4.42	7.02	11.38	6.67	10.84	9.77
Does not apply	44.20	26.32	38.92	40.00	38.67	33.83
Remove needles, leaves and overhanging branches from the roof and gutter						
Done	65.76	56.14	65.87	57.50	65.51	58.05
Plan to do in next year	15.22	10.53	17.96	11.67	10.92	15.36
Plan to do in next 5 years	1.63	7.02	1.20	0.83	1.74	0.75
Do not plan to do	3.26	3.51	1.20	0.83	1.74	1.87
Does not apply	14.13	22.81	13.77	29.17	20.10	23.97

Table 4 continued. *Completion of Landscape Wildfire Mitigation Measures, by Community*

	Low Community Level Wildfire Management			Moderate to High Community Level Wildfire Management		
	Edson *(n = 186)*	High Level *(n = 57)*	Peace River *(n = 168)*	Grande Cache *(n= 120)*	Hinton *(n = 410)*	Whitecourt *(n = 268)*
Landscape with fire resistant materials and vegetation						
Done	34.24	46.43	32.93	35.04	33.17	36.88
Plan to do in next year	7.07	1.79	4.27	5.13	6.23	8.37
Plan to do in next 5 years	3.26	8.93	4.27	3.42	5.24	4.56
Do not plan to do	32.07	28.57	36.59	30.77	33.67	30.80
Does not apply	23.37	14.29	21.95	25.64	21.70	19.39
Remove debris or needle build up under balconies and porches						
Done	52.97	60.71	58.08	62.18	54.07	54.51
Plan to do in next year	7.57	5.36	5.39	1.68	7.41	9.77
Plan to do in next 5 years	1.08	3.57	0.60	0.84	0.49	0.38
Do not plan to do	2.16	0.00	4.19	5.04	4.2	1.88
Does not apply	36.22	30.36	31.74	30.25	33.83	33.46
Prune large trees by removing all branches that are close to the ground						
Done	55.68	57.89	61.68	49.15	56.25	55.30
Plan to do in next year	9.19	7.02	11.98	4.24	7.50	5.68
Plan to do in next 5 years	1.08	1.75	1.80	0.85	2.75	2.65
Do not plan to do	9.19	5.26	9.58	8.47	6.75	8.33
Does not apply	24.86	28.07	14.97	37.29	26.75	28.03
Screen house vents, gutters and the underside of eaves with metal mesh						
Done	31.67	33.33	37.80	38.98	38.58	29.01
Plan to do in next year	10.56	3.51	12.20	10.17	8.38	11.07
Plan to do in next 5 years	4.44	8.77	6.10	6.78	5.33	6.49
Do not plan to do	37.22	42.11	34.15	27.12	36.04	41.98
Does not apply	16.11	12.28	9.76	16.95	11.68	11.45
Screen or enclose the underside of decks and porches						
Done	33.88	36.84	33.53	31.93	35.06	33.33
Plan to do in next year	10.93	17.54	7.78	8.40	10.12	13.26
Plan to do in next 5 years	2.73	7.02	2.99	1.68	3.46	4.92
Do not plan to do	26.23	22.81	28.14	27.73	23.95	27.65
Does not apply	26.23	15.79	27.54	30.25	27.41	20.83

Table 5. *Completion of Structural Wildfire Mitigation Measures, by Community*

	Low Community Level Wildfire Management			Moderate to High Community Level Wildfire Management		
	Edson *(n = 186)*	High Level *(n = 57)*	Peace River *(n = 168)*	Grande Cache *(n= 120)*	Hinton *(n = 410)*	Whitecourt *(n = 268)*
Intall fire retardant roofing materials						
Done	67.76	59.65	58.54	64.17	54.61	59.18
Plan to do in next 5 years	2.19	3.51	6.10	2.50	5.74	4.12
Plan to do when it needs replacing	7.10	5.26	7.32	11.67	13.47	7.12
Do not plan to do	18.58	31.58	23.78	17.50	23.44	25.47
Does not apply	4.37	0.00	4.27	4.17	2.74	4.12
Install double/thermal pane or tempered glass in windows and exterior glass doors						
Done	52.97	70.18	55.42	73.33	57.88	53.38
Plan to do in next 5 years	8.11	3.51	10.84	7.50	9.36	9.77
Plan to do when it needs replacing	14.05	8.77	10.84	10.00	13.05	10.53
Do not plan to do	21.62	17.54	20.48	5.83	17.73	21.80
Does not apply	3.24	0.00	2.41	3.33	1.97	4.51
Intall fire resistant exterior siding						
Done	53.80	25.00	34.34	38.66	40.39	32.96
Plan to do in next 5 years	3.80	1.79	5.42	3.36	5.91	6.74
Plan to do when it needs replacing	7.61	7.14	7.83	11.76	11.08	9.74
Do not plan to do	29.35	66.07	45.78	42.02	39.66	46.82
Does not apply	5.43	0.00	6.63	4.20	2.96	3.75

Table 6. *Completion of Landscape Wildfire Mitigation Measures, by Community Wildfire Management Level*

	Low Community Level Wildfire Management *(n = 411)*	**Moderate to High Community Level Wildfire Management** *(n= 798)*
Keep grass short and watered frequently[1]		
Done	89.14	88.82
Plan to do in next year	1.23	2.54
Plan to do in next 5 years	0.00	0.64
Do not plan to do	5.43	4.32
Does not apply	4.20	3.68
Remove shrubs, trees or fallen branches close to your		
Done	62.41	65.39
Plan to do in next year	5.65	4.45
Plan to do in next 5 years	0.98	1.02
Do not plan to do	13.76	11.83
Does not apply	17.20	17.31
Thin shrubs or tress so that nearby plans and trees do not touch[3]		
Done	42.61	44.59
Plan to do in next year	6.40	7.39
Plan to do in next 5 years	1.23	2.17
Do not plan to do	24.92	16.31
Does not apply	24.84	29.54
Store firewood well away from your house[4]		
Done	48.64	48.11
Plan to do in next year	3.46	4.17
Plan to do in next 5 years	0.74	0.63
Do not plan to do	7.65	9.85
Does not apply	39.51	37.24
Remove needles, leaves and overhanging branches from the roof and gutter[5]		
Done	64.46	61.77
Plan to do in next year	15.69	12.53
Plan to do in next 5 years	2.21	1.27
Do not plan to do	2.45	1.65
Does not apply	15.19	22.78

[1] $\chi^2(4, 1192) = 5.6389, p = 0.2278$

[2] $\chi^2(4, 1193) = 1.9657, p = 0.7421$

[3] $\chi^2(4, 1191) = 6.7747, p = 0.1483$

[4] $\chi^2(4, 1197) = 2.1843, p = 0.7019$

[5] $\chi^2(4, 1198) = 12.3566, p = 0.0149$

Table 6 continued. *Completion of Landscape Wildfire Mitigation Measures, by Community Wildfire Management Level*

	Low Community Level Wildfire Management *(n = 411)*	**Moderate to High Community Level Wildfire Management** *(n= 798)*
Landscape with fire resistant materials and vegetation[1]		
Done	35.40	34.70
Plan to do in next year	5.20	6.79
Plan to do in next 5 years	4.46	4.74
Do not plan to do	33.42	32.27
Does not apply	21.52	21.50
Remove debris or needle build up under balconies and		
Done	56.13	55.44
Plan to do in next year	6.37	7.34
Plan to do in next 5 years	1.23	0.51
Do not plan to do	2.70	3.54
Does not apply	33.57	33.17
Prune large trees by removing all branches that are close to the ground[2]		
Done	58.44	54.86
Plan to do in next year	10.02	6.39
Plan to do in next 5 years	1.47	2.43
Do not plan to do	8.80	7.54
Does not apply	21.27	28.78
Screen house vents, gutters and the underside of eaves with metal mesh[3]		
Done	34.41	35.4
Plan to do in next year	10.22	9.56
Plan to do in next 5 years	5.74	5.94
Do not plan to do	36.66	36.69
Does not apply	12.97	12.41
Screen or enclose the underside of decks and porches[3]		
Done	34.15	34.01
Plan to do in next year	10.57	10.91
Plan to do in next 5 years	3.44	3.68
Do not plan to do	26.54	25.76
Does not apply	25.31	25.64

[1] $\chi^2(4, 1185) = 1.2659, p = 0.8671$

[2] $\chi^2(4, 1192) = 5.6389, p = 0.2278$

[3] $\chi^2(4, 1198) = 2.8438, p = 0.5843$

[4] $\chi^2(4, 1191) = 0.2785, p = 0.9912$

[5] $\chi^2(4, 1195) = 0.1480 p = 0.9974$

Table 7. *Completion of Structural Wildfire Mitigation Measures, by Community Wildfire Management Level*

	Low Community Level Wildfire Management (n = 411)	Moderate to High Community Level Wildfire Management (n= 798)
Intall fire retardant roofing materials[1]		
Done	62.87	57.61
Plan to do in next 5 years	3.96	4.70
Plan to do when it needs replacing	6.93	11.04
Do not plan to do	22.52	23.22
Does not apply	3.71*	3.43
Install double/thermal pane or tempered glass in windows and exterior glass doors[2]		
Done	56.37	58.71
Plan to do in next 5 years	8.58	9.22
Plan to do when it needs replacing	12.01	11.74
Do not plan to do	20.59	17.3
Does not apply	2.45	3.03
Intall fire resistant exterior siding[3]		
Done	41.87	37.63
Plan to do in next 5 years	4.19	5.81
Plan to do when it needs replacing	7.64	10.73
Do not plan to do	41.13	42.42
Does not apply	5.17	3.41

[1] $\chi^2(4, 1192) = 6.3621$, $p = 0.1737$

[2] $\chi^2(4, 1200) = 2.2947$, $p = 0.6817$

[3] $\chi^2(4, 1198) = 7.4275$, $p = 0.1150$

Table 8. *Chi-square values for completion of all Wildfire Mitigation Measures, by Community*

	Chi-square for Communities
Keep grass short and watered frequently	χ^2 (20, 1192) = 21.1104, p = 0.3907
Remove shrubs, trees or fallen branches close to your house	χ^2 (20, 1193) = 25.5022, p = 0.1829
Thin shrubs or trees so that nearby plants and trees do not touch	χ^2 (20, 1191) = 22.5484, p = 0.3115
Store firewood well away from your house	χ^2 (20, 1197) = 24.5524, p = 0.2191
Remove needles, leaves and overhanging branches from the roof and gutter	χ^2 (20, 1198) = 38.818, p = 0.0070
Landscape with fire resistant materials and vegetation	χ^2 (20, 1192) = 16.5832, p = 0.6790
Remove debris or needle build up under balconies and porches	χ^2 (20, 1198) = 25.5598, p = 0.1808
Prune large trees by removing all branches that are close to the ground	χ^2 (20, 1191) = 29.3472, p = 0.0811
Screen house vents, gutters and the underside of eaves with metal mesh	χ^2 (20, 1192) = 23.1483, p = 0.2816
Screen or enclose the underside of decks and porches	χ^2 (20, 1195) = 19.3768, p = 0.4975
Intall fire retardant roofing materials	χ^2 (20, 1192) = 31.1064, p = 0.0538
Install double/thermal pane or tempered glass in windows and exterior glass doors	χ^2 (20, 1200) = 33.3017, p = 0.0313
Intall fire resistant exterior siding	χ^2 (20, 1198) = 48.6989, p =0.0003

Table 9. *Evacuation Plan Decisions, by Community*

	Low Community Level Wildfire Management			**Moderate to High Community Level Wildfire Management**		
	Edson	High Level	Peace River	Grande Cache	Hinton	Whitecourt
	(n = 186)	*(n = 57)*	*(n = 168)*	*(n= 120)*	*(n = 410)*	*(n = 268)*
Evacuation Plan[1]						
Done	34.25	33.93	49.70	42.61	26.90	35.77
Plan to do	35.36	30.36	32.12	36.52	47.21	41.15
Do not plan to do	30.39	35.71	18.18	20.87	25.89	23.08

[1] $\chi^2(10, 1171) = 38.9506$, $p < 0.0001$

Table 10. *Evacuation Plan Decisions, by Community Wildfire Management Level*

	Low Community Level Wildfire Management	**Moderate to High Community Level Wildfire Management**
	(n = 411)	*(n= 798)*
Evacuation Plan[1]		
Done	34.25	42.61
Plan to do	35.36	36.52
Do not plan to do	30.39	20.87

[1] $\chi^2(2, 1171) = 12.4730$, $p = 0.0020$

Table 11. *Risk Perception Indicators, by Community*

	ANOVA	Low Community Level Wildfire Management			Moderate to High Community Level Wildfire Management		
	F-value	Edson *(n = 186)*	High Level *(n = 57)*	Peace River *(n = 168)*	Grande Cache *(n= 120)*	Hinton *(n = 410)*	Whitecourt *(n = 268)*
Hazard Risk Perception							
Wildfire	17.00***	3.60 (1.59)	3.46 (1.79)	3.45 (1.61)	4.93 (1.79)a	4.30 (1.76)b	4.30 (1.73)b
Hail	9.76***	4.46 (1.61)a	3.21 (1.58)c	3.90 (1.41)bc	3.52 (1.76)c	3.72 (1.59)bc	4.07 (1.54)ab
Climate Change	1.94	3.78 (2.02)	3.27 (1.65)	4.11 (1.72)	3.94 (2.11)	3.79 (1.83)	3.89 (1.81)
Drought	2.16	3.34 (1.80)	3.21 (1.52)	3.68 (1.72)	3.15 (1.65)	3.36 (1.73)	3.58 (1.61)
Tornadoes	19.20***	2.93 (1.72)a	3.69 (1.90)bc	2.77 (1.56)ab	1.97 (1.44)c	2.05 (1.36)c	2.95 (1.53)a
Mountain Pine Beetle	17.37***	4.49 (2.05)ab	2.17 (1.52)a	4.64 (2.10)bc	5.86 (1.77)e	5.41 (1.81)de	5.07 (1.89)cd
Flooding	63.65***	3.25 (1.90)a	2.43 (1.70)bc	4.97 (2.06)	2.01 (1.40)c	2.30 (1.57)c	3.12 (1.92)ab
Wildfire Risk Perception							
Wildfire risk to property	12.80***	3.22 (1.63)a	3.02 (1.77)a	3.25 (1.69)a	4.50 (1.90)c	3.85 (1.78)b	3.86 (1.72)b
Wildfire risk to community	15.20***	4.03 (1.58)a	3.96 (1.65)a	4.11 (1.54)a	4.96 (1.82)b	4.84 (1.43)b	4.81 (1.37)b
Wildfire risk to environment	3.75*	5.16 (1.71)ab	4.88 (1.67)b	5.24 (1.55)ab	5.68 (1.63)a	5.44 (1.60)ab	5.56 (1.42)a
Controllability							
Controllability of wildfires impacts to property	3.02*	5.08 (1.75)ab	5.60 (1.47)b	5.25 (1.58)ab	4.79 (1.56)a	4.92 (1.58)a	5.10 (1.53)ab
Controllability of wildfire impacts to community	2.44	4.87 (1.56)	5.20 (1.42)	4.82 (1.44)	4.61 (1.56)	4.62 (1.44)	4.82 (1.31)
Controllability of wildfire impacts to environment	1.75	4.01 (1.78)	4.36 (1.79)	3.84 (1.61)	3.86 (1.77)	3.81 (1.66)	4.07 (1.50)

Note: The *F* statistic is computed from a one-way analysis of variance

*** $p < 0.0001$, * $p < 0.05$

Table 11 continued. *Means and Proportions for Risk Perception Indicators, by Community*

		Low Community Level Wildfire Management			Moderate to High Community Level Wildfire Management		
	ANOVA *F-value*	Edson *(n = 186)*	High Level *(n = 57)*	Peace River *(n = 168)*	Grande Cache *(n= 120)*	Hinton *(n = 410)*	Whitecourt *(n = 268)*
Acceptability							
Acceptability of wildfire impacts to property	0.65	2.14 (1.74)	2.24 (1.85)	2.07 (1.68)	2.13 (1.77)	1.96 (1.64)	2.15 (1.65)
Acceptability of wildfire impacts to community	0.76	2.24 (1.69)	2.35 (1.71)	2.13 (1.47)	2.21 (1.82)	2.13 (1.65)	2.36 (1.63)
Acceptability of wildfire impacts to environment	0.48	3.49 (2.16)	3.62(2.31)	3.53 (2.00)	3.83 (2.22)	3.63 (2.08)	3.66 (1.90)
Likelihood a wildfire will occur in the next year	5.54***	3.32 (1.17)ac	3.20 (1.30)abc	3.24 (1.30)a	3.67 (1.16)bc	3.59(1.14)bc	3.68(1.10)b
Very unlikely		6.49	12.50	11.38	4.20	5.62	4.48
Unlikely		20.00	21.43	20.36	14.29	11.25	11.19
Not sure		25.41	16.07	22.16	20.17	25.18	20.52
Likely		31.35	33.93	25.15	32.77	34.23	39.55
Very likely		16.22	16.07	20.96	28.57	23.47	24.25
No opinion		0.54	0.00	0.00	0.00	0.24	0.00
Hazard Anxiety	1.64	4.16 (2.13)	3.84(1.97)	3.87 (2.06)	4.48 (2.20)	4.24 (2.01)	4.15 (1.98)

Note: The *F* statistic is computed from a one-way analysis of variance

*** $p < 0.0001$

Table 12. *Means and Proportions for risk Perception Indicators, by Community Wildfire Management Level*

	t-value	**Low Community Level Wildfire Management** *(n = 411)*	**Moderate to High Community Level Wildfire Management** *(n= 798)*
Hazard Risk Perception			
Wildfire	-8.36*	3.52 (1.62)	4.39 (1.76)
Hail	2.57*	4.06 (1.58)	2.81 (1.61)
Climate Change	-0.05	3.84 (1.87)	3.85 (1.86)
Drought	0.56	3.46 (1.74)	3.40 (1.69)
Tornadoes	4.37*	2.76 (1.64)	2.35 (1,49)
Mountain Pine Beetle	-7.80*	4.44 (2.07)	5.36 (1.85)
Flooding	11.33**	3.84 (2.17)	2.53 (1.73)
Wildfire Risk Perception			
Wildfire risk to property	-6.98*	3.21 (1.67)	3.95 (1.79)
Wildfire risk to community	-8.65*	4.05 (1.57)	4.85 (1.48)
Wildfire risk to environment	-3.75*	5.16 (1.64)	5.52 (1.55)
Controllability			
Controllability of wildfires impacts to property	2.60*	5.22 (1.65)	4.96 (1.56)
Controllability of wildfire impacts to community	2.34*	4.89 (1.49)	4.69 (1.42)
Controllability of wildfire impacts to environment	0.80	3.99 (1.72)	3.91 (1.63)
Acceptability			
Acceptability of wildfire impacts to property	0.70	2.12 (1.73)	2.05 (1.66)
Acceptability of wildfire impacts to community	-0.08	2.21 (1.60)	2.22 (1.67)
Acceptability of wildfire impacts to environment	-1.18	3.52 (2.11)	3.67 (2.04)
Likelihood a wildfire will occur in the next year	-5.10**	3.27 (1.24)	3.63 (1.13)
Very unlikely		9.31	5.03
Unlikely		20.34	11.68
Not sure		22.79	22.86
Likely		29.17	35.80
Very likely		18.14	24.50
No opinion		0.25	0.13
Hazard Anxiety	-1.96	4.00 (2.08)	4.24 (2.03)

* $p < 0.05$, ** $p < 0.0001$

Table 13. *Wildfire Experience, by Community*

		Low Community Level Wildfire Management			Moderate to High Community Level Wildfire Management		
		Edson *(n = 186)*	High Level *(n = 57)*	Peace River *(n = 168)*	Grande Cache *(n= 120)*	Hinton *(n = 410)*	Whitecourt *(n = 268)*
Experience (Direct & Indirect)	χ^2 (5, 1209) = 8.3847, p = 0.1363	95.16	98.25	96.43	99.17	97.32	98.88
Read or watched coverage in the media	χ^2 (5, 1204) = 1.9051, p = 0.8621	94.02	92.98	95.18	96.67	93.89	94.78
Felt fear or anxiety	χ^2 (5, 1204) = 33.7478, $p<$ 0.0001	36.41	21.05	28.31	50.00	44.01	48.51
Experienced discomfort or health problems from smoke	χ^2 (5, 1204) = 36.31, $p<$ 0.0001	23.37	26.32	22.29	44.17	40.83	30.60
Placed on evacuation alert	χ^2 (5, 1204) = 154.120, $p<$ 0.0001	15.76	5.26	6.02	25.00	11.49	44.78
Evacuated	χ^2 (5, 1204) = 10.1904, p = 0.0700	3.26	3.51	0.60	1.67	2.69	5.60
Experience or training in fire management or firefighting	χ^2 (5, 1204) = 9.0456, p = 0.1073	16.30	17.54	15.66	21.67	16.63	24.25
Lost house or other structures on property	χ^2 (5, 1204) = 2.1666, p = 0.8256	1.09	0.00	0.60	0.00	0.73	1.12
Someone close to me has lost their house	χ^2 (5, 1204) = 6.0950, p = 0.2971	5.43	5.26	6.63	0.83	5.38	4.10
Seen smoke or flames near house	χ^2 (5, 1204) = 19.9430, p= 0.0013	33.15	19.30	33.73	50.83	35.21	38.06
Close to my community	χ^2 (5, 1204) = 83.2149, $p<$ 0.0001	44.02	31.58	45.18	71.67	60.64	74.63
No experience	χ^2 (5, 1203) = 45.5493, $p<$ 0.0001	30.98	29.82	35.54	15.00	18.34	13.86
Direct Experience	χ^2 (5, 1209) = 62.7691, $p<$ 0.0001	71.51	57.89	69.05	86.67	84.39	89.55
Indirect Experience	χ^2 (5, 1209) = 2.4313, p =0.7868	93.01	92.98	94.64	96.67	94.15	95.15

Table 14. *Wildfire Experience, by Community Wildfire Management Level*

		Low Community Level Wildfire Management *(n = 407)*	**Moderate to High Community Level Wildfire Management** *(n= 797)*
Experience (Direct & Indirect)	χ^2 (1, 1209) = 4.4011, p <0.05	96.11	98.12
Read or watched coverage in the media	χ^2 (1, 1204) = 0.0340, p = 0.8536	94.35	94.60
Felt fear or anxiety	χ^2 (1, 1204) = 26.6019, p< 0.0001	30.96	46.42
Experienced discomfort or health problems from smoke	χ^2 (1, 1204) = 25.8092, p< 0.0001	23.34	37.89
Placed on evacuation alert	χ^2 (1, 1204) = 35.1055, p< 0.0001	10.32	24.72
Evacuated	χ^2 (1, 1204) = 1.5330, p = 0.2157	2.21	3.51
Experience or training in fire management or firefighting	χ^2 (1, 1204) = 2.4715, p = 0.1159	16.22	19.95
Lost house or other structures on property	χ^2 (1, 1204) = 0.0009, p = 0.9761	0.74	0.75
Someone close to me has lost their house	χ^2 (1, 1204) = 1.5627, p = 0.2113	5.90	4.27
Seen smoke or flames near house	χ^2 (1, 1204) = 25.8092, p= 0.0157	31.45	38.52
Close to my community	χ^2 (1, 1204) = 65.3983, p< 0.0001	42.75	67.00
No experience	χ^2 (1, 1204) = 42.1248, p< 0.0001	32.68	16.33
Direct Experience	χ^2 (1, 1209) = 58.861, p< 0.0001	68.61	86.47
Indirect Experience	χ^2 (5, 1203) = 0.7316, p = 0.3923	93.67	94.86

Table 15. *Wildfire Knowledge, by Community*

		Low Community Level Wildfire Management			Moderate to High Community Level Wildfire Management		
	ANOVA	Edson	High Level	Peace River	Grande Cache	Hinton	Whitecourt
	F-value	*(n = 186)*	*(n = 57)*	*(n = 168)*	*(n= 120)*	*(n = 410)*	*(n = 268)*
Knowledge score	1.83	4.27 (1.64)	4.34 (1.47)	4.09 (1.61)	4.57 (1.57)	4.46 (1.49)	4.39 (1.58)
Wildfires burn faster going up hill.[1]							
Mostly true		62.16	66.67	58.43	66.39	63.59	63.50
Mostly false		8.65	12.28	8.43	2.52	9.48	6.46
Not sure		29.19	21.05	33.13	31.09	26.93	30.04
Houses only burn when the flames from a wildfire reach the house.[2]							
Mostly true		9.84	1.79	13.41	8.33	13.12	10.23
Mostly false		79.78	94.64	75.00	83.33	77.97	81.82
Not sure		10.38	3.57	11.59	8.33	8.91	7.95
Wildfires can be an important force in controling outbreaks of disease and insects in forests.[3]							
Mostly true		83.78	78.57	79.39	85.71	87.10	83.52
Mostly false		7.03	12.50	9.09	5.88	4.71	6.37
Not sure		9.19	8.93	11.52	8.40	8.19	10.11
It takes decades before plants grow in a fire damaged forest.[4]							
Mostly true		22.95	22.81	21.21	12.61	16.26	17.23
Mostly false		74.32	73.68	73.94	79.83	79.56	76.40
Not sure		2.73	3.51	4.85	7.56	4.19	6.37
Wildfires usually result in the death of most animals in the burnt area.[5]							
Mostly true		24.46	32.73	28.66	20.00	22.58	23.60
Mostly false		57.61	56.36	54.88	65.83	61.54	57.30
Not sure		17.93	10.91	16.46	14.17	15.88	19.10
Wildfires help recycle minerals and nutrients needed by trees and other plants.[6]							
Mostly true		69.73	64.29	68.86	74.17	75.12	76.05
Mostly false		9.19	17.86	11.98	11.67	8.62	7.98
Not sure		21.08	17.86	19.16	14.17	16.26	15.97

[1] $\chi^2(10, 1191) = 11.8297$, $p = 0.2966$

[2] $\chi^2(10, 1191) = 14.3134$, $p = 0.1592$

[3] $\chi^2(10, 1191) = 9.7346$, $p = 0.4641$

[4] $\chi^2(10, 1197) = 13.0912$, $p = 0.2186$

[5] $\chi^2(10, 1193) = 9.2924$, $p = 0.5046$

[6] $\chi^2(10, 1197) = 11.4319$, $p = 0.3249$

Table 16. *Wildfire Knowledge, by Community Wildfire Management Level*

		Low Community Level Wildfire Management (*n* = 411)	Moderate to High Community Level Wildfire Management (*n*= 798)
Knowledge score	-2.51*	4.21 (1.60)	4.45 (1.53)
Wildfires burn faster going up hill.	χ^2 (1, 1191) = 1.3423, p = 0.5111		
Mostly true		61.27	63.98
Mostly false		9.07	7.41
Not sure		29.66	28.61
Houses only burn when the flames from a wildfire reach the house.	χ^2 (1, 1191) = 0.9794, p = 0.6128		
Mostly true		10.17	11.42
Mostly false		79.90	80.08
Not sure		9.93	8.50
Wildfires can be an important force in controlling outbreaks of disease and insects in forests.	χ^2 (1, 1195) = 5.1787, p = 0.0751		
Mostly true		81.28	85.68
Mostly false		8.62	5.45
Not sure		10.10	8.87
It takes decades before plants grow in a fire damaged forest.	χ^2 (1, 1197) = 7.9972, p = 0.0183		
Mostly true		22.22	16.04
Mostly false		74.07	78.54
Not sure		3.71	5.42
Wildfires usually result in the death of most animals in the burnt area.	χ^2 (1, 1193) = 3.4107, p = 0.1817		
Mostly true		27.30	22.53
Mostly false		56.33	60.76
Not sure		16.37	16.71
Wildfires help recycle minerals and nutrients needed by trees and other plants.	χ^2 (1, 1197) = 6.0742, p = 0.0480		
Mostly true		68.63	75.29
Mostly false		11.52	8.87
Not sure		19.85	15.84

* t-value, significant at $p < 0.05$

Table 17. *Means and Proportions for Wildfire Awareness, by Community*

		Low Community Level Wildfire Management			**Moderate to High Community Level Wildfire Management**		
	ANOVA *F-value*	Edson *(n = 186)*	High Level *(n = 57)*	Peace River *(n = 168)*	Grande Cache *(n= 120)*	Hinton *(n = 410)*	Whitecourt *(n = 268)*
Critical Awareness							
Think about wildfires	3.49*	2.86 (1.05)ab	3.07 (1.18)ab	2.69 (0.91)a	3.02 (1.01)ab	2.95 (0.92)b	3.06 (0.95)b
Never		6.52	5.45	9.04	4.27	4.67	5.62
Rarely		32.61	29.09	31.93	26.5	26.04	23.6
A few times a year		48.91	40	53.01	57.26	53.56	52.06
Once a month		5.98	9.09	2.41	2.56	10.32	11.24
Once a week or more		4.35	14.55	2.41	6.84	4.67	6.37
Not sure		1.63	1.82	1.2	2.56	0.74	1.12
Talk about wildfires	3.67*	2.74 (0.95)ab	3.04 (1.17)b	2.61 (0.87)a	2.89 (0.98)ab	2.86 (0.89)b	2.93 (0.96)b
Never		7.07	5.26	7.83	3.36	4.42	2.62
Rarely		27.72	28.07	30.12	22.69	22.60	22.47
A few times a year		49.46	40.35	54.22	56.30	54.79	52.43
Once a month		5.98	8.77	2.41	7.56	10.32	12.36
Once a week or more		7.61	15.79	4.22	6.72	7.37	8.36
Not sure		2.17	1.75	1.20	3.36	0.49	0.75
Searched for wildfire information[1]							
Yes		18.38	20.00	7.78	24.37	21.92	23.13
No		81.62	80.00	92.22	75.63	78.08	76.87
Heard of FireSmart[2]							
Yes		63.78	54.55	47.90	71.19	79.61	57.84
No		36.22	45.45	52.10	28.81	20.39	42.16

Note: The *F* statistic is computed from a one-way analysis of variance

* $p < 0.05$

[1] $\chi^2(5, 1200) = 19.99, p = 0.0013$

[2] $\chi^2(5, 1200) = 70.8583, p < 0.0001$

Table 17 continued. *Means and Proportions for Wildfire Awareness, by Community*

	Low Community Level Wildfire Management			Moderate to High Community Level Wildfire Management		
	Edson *(n = 186)*	High Level *(n = 57)*	Peace River *(n = 168)*	Grande Cache *(n= 120)*	Hinton *(n = 410)*	Whitecourt *(n = 268)*
Hazard Home and Site Assessment completed[1]						
Yes	2.75	5.26	0.62	5.08	3.23	5.88
No	80.77	80.70	90.06	78.81	85.36	81.18
Not sure	16.48	14.04	9.32	16.10	11.41	12.94
If an assessment was done, who completed the assessment?						
You	2.69	3.51	0.60	1.67	0.98	2.63
Local fire department	1.08	1.75	0.00	3.33	0.98	1.87
Private contractor	0.00	0.00	0.00	0.00	0.24	1.12
Provincial government	0.00	1.75	0.00	0.83	0.73	0.37
Other	0.00	0.00	0.00	0.00	0.00	0.37
If a Hazard Home and Site Assessment was done, were the suggestions completed?[2]						
Yes	100.00	100.00	100.00	83.33	92.31	100.00
No	0.00	0.00	0.00	16.67	7.69	0.00
Aware of any wildfire management activity occuring around the community?[3]						
Yes	19.57	23.21	12.20	84.17	69.63	26.62
No	23.91	33.93	30.49	2.50	7.65	13.69
Not sure	53.52	42.86	57.32	13.33	22.72	59.70

[1] $\chi^2(10, 1176) = 16.0000$, $p = 0.0997$

[2] $\chi^2(5, 37) = 2.6496$, $p = 0.7538$

[3] $\chi^2(10, 1192) = 366.15$, $p < 0.0001$

Table 18. *Means and Proportions for Wildfire Awareness Indicators, by Community Wildfire Management Level*

	t-value	**Low Community Level Wildfire Management** *(n = 411)*	**Moderate to High Community Level Wildfire Management** *(n= 798)*
Critical Awareness			
Think about wildfires	-3.01*	2.72 (0.95)	2.82 (0.90)
Never		7.41	4.93
Rarely		31.85	25.28
A few times a year		49.38	53.6
Once a month		4.94	9.48
Once a week or more		4.94	5.56
Not sure		1.48	1.14
Talk about wildfires	-2.84*	2.63 (0.90)	2.82 (0.88)
Never		7.13	3.66
Rarely		28.75	22.57
A few times a year		50.12	54.22
Once a month		4.91	10.59
Once a week or more		7.37	7.94
Not sure		1.72	1.01

* $p < 0.05$

Table 18 continued. *Means and Proportions for Wildfire Awareness, by Community Wildfire Management Level*

	Low Community Level Wildfire Management *(n = 411)*	**Moderate to High Community Level Wildfire Management** *(n= 798)*
Searched for wildfire information[1]		
Yes	14.25	22.70
No	85.75	77.30
Heard of FireSmart[2]		
Yes	56.02	71.00
No	43.98	29.00
Hazard Home and Site Assessment completed[3]		
Yes	2.25	4.38
No	84.50	82.99
Not sure	13.25	12.63
If an assessment was done, who completed the assessment?		
You	1.96	1.64
Local fire department	0.73	1.63
Private contractor	0.00	0.50
Provincial government	0.24	0.63
Other	0.00	0.13
If a Hazard Home and Site Assessment was done, were the suggestions completed?[4]		
Yes	100.00	6.90
No	0.00	93.10
Aware of any wildfire management activity occuring around the community?[5]		
Yes	17.08	57.49
No	27.97	8.88
Not sure	54.95	33.63

[1] $\chi^2(1, 1200) = 12.0727$, $p = 0.0005$

[2] $\chi^2(1, 1200) = 26.8518$, $p < 0.0001$

[3] $\chi^2(2, 1176) = 3.4309$, $p = 0.1799$

[4] $\chi^2(1, 37) = 0.5833$, $p = 0.4450$

[5] $\chi^2(2, 1192) = 192.6742$, $p < 0.0001$

Table 19. *Means and Proportions for Psychological and Social Characteristics, by Community*

		Low Community Level Wildfire Management			**Moderate to High Community Level Wildfire Management**		
	ANOVA	Edson	High Level	Peace River	Grande Cache	Hinton	Whitecourt
	F-value	*(n = 186)*	*(n = 57)*	*(n = 168)*	*(n= 120)*	*(n = 410)*	*(n = 268)*
Outcome Expectancy							
Preparing for wildfires will reduce damage to my house	0.77	3.84 (1.13)	3.54 (1.05)	3.69 (1.12)	3.75 (1.11)	3.78 (1.13)	3.77 (1.08)
Strongly disagree		1.64	1.75	2.45	5.00	2.74	2.26
Disagree		13.11	15.79	14.72	6.67	12.69	10.94
Neutral		16.39	26.32	17.79	24.17	18.41	21.13
Agree		44.81	42.11	47.85	39.17	40.30	43.40
Strongly agree		16.94	10.53	11.04	22.50	21.89	17.74
No opinion		7.10	3.51	6.13	2.50	3.98	4.53
Too destructive to bother preparing	1.00	2.18 (1.18)	2.44 (1.48)	2.12 (1.11)	2.17 (1.32)	2.13 (1.19)	2.27 (1.26)
Strongly disagree		25.54	26.32	28.83	35.00	29.60	24.53
Disagree		51.63	43.86	46.63	39.17	47.76	49.81
Neutral		13.04	8.77	15.34	13.33	13.18	12.83
Agree		3.80	10.53	4.91	4.17	3.48	5.66
Strongly agree		1.09	1.75	1.23	3.33	1.49	1.51
No opinion		4.89	8.77	3.07	5.00	4.48	5.66
Self-efficacy							
Considerable control over life	1.32	4.15 (0.91)	4.27 (0.92)	4.25 (0.76)	4.25 (0.83)	4.10 (0.84)	4.15 (0.75)
Strongly disagree		2.23	1.79	0.62	0.00	1.00	0.38
Disagree		2.79	5.36	3.09	4.24	4.76	3.80
Neutral		11.17	1.79	5.56	11.02	9.52	7.22
Agree		46.93	50.00	53.70	41.53	53.88	58.56
Strongly agree		35.20	37.50	35.80	42.37	30.08	29.28
No opinion		1.68	3.57	1.23	0.85	0.75	0.76

Note: The *F* statistic is computed from a one-way analysis of variance

Table 19 continued. *Means and Proportions for Psychological and Social Characteristics, by Community*

	ANOVA	Low Community Level Wildfire Management			Moderate to High Community Level Wildfire Management		
		Edson	High Level	Peace River	Grande Cache	Hinton	Whitecourt
	F-value	*(n = 186)*	*(n = 57)*	*(n = 168)*	*(n= 120)*	*(n = 410)*	*(n = 268)*
Self-efficacy							
Solve most of my problems myself	0.63	4.09 (0.85)	4.05 (1.10)	4.01 (0.81)	4.17 (0.84)	4.05 (0.78)	4.08 (0.73)
Strongly disagree		1.10	1.79	0.00	2.52	0.75	0.38
Disagree		4.42	12.50	6.67	1.68	5.49	3.82
Neutral		8.84	3.57	10.91	5.88	6.73	9.16
Agree		58.56	48.21	58.79	57.98	62.59	61.45
Strongly agree		24.31	28.57	22.42	30.25	23.94	24.81
No opinion		2.76	5.36	1.21	1.68	0.50	0.38
Problem-focused coping							
Come up with a strategy	1.96	4.22 (0.68)	4.45 (0.60)	4.25 (0.59)	4.31 (0.58)	4.22 (0.60)	4.21 (0.56)
Strongly disagree		1.11	0.00	0.00	0.00	0.25	0.00
Disagree		0.56	0.00	0.61	0.00	0.50	0.00
Neutral		4.44	0.00	4.88	4.24	5.54	6.49
Agree		65.00	60.00	64.63	61.86	64.74	66.41
Strongly agree		27.22	34.55	28.66	32.20	28.21	26.34
No opinion		1.67	5.45	1.22	1.69	0.76	0.76
Think about how best to handle problem	1.32	4.27 (0.66)	4.33 (0.64)	4.36 (0.61)	4.36 (0.58)	4.29 (0.58)	4.24 (0.56)
Strongly disagree		1.11	0.00	0.00	0.00	0.25	0.00
Disagree		0.56	0.00	0.00	0.00	0.25	33.33
Neutral		1.67	5.45	5.45	3.39	4.00	25.53
Agree		65.56	60.00	53.94	58.47	62.00	23.80
Strongly agree		29.44	30.91	39.39	36.44	33.00	19.06
No opinion		1.67	3.64	1.21	1.69	0.50	15.38

Note: The *F* statistic is computed from a one-way analysis of variance

Table 19 continued. *Means and Proportions for Psychological and Social Characteristics, by Community*

	ANOVA	Low Community Level Wildfire Management			Moderate to High Community Level Wildfire Management		
	F-value	Edson *(n = 186)*	High Level *(n = 57)*	Peace River *(n = 168)*	Grande Cache *(n= 120)*	Hinton *(n = 410)*	Whitecourt *(n = 268)*
Problem-focused coping							
Sometimes feel helpless	0.59	2.47 (1.14)	2.61 (1.23)	2.36 (1.08)	2.41 (1.14)	2.44 (1.06)	2.39 (1.02)
Strongly disagree		15.56	14.29	17.79	21.55	16.46	15.77
Disagree		47.78	44.64	50.31	41.38	45.82	50.38
Neutral		17.78	17.86	15.34	16.39	18.48	5.38
Agree		14.44	16.07	13.5	18.1	16.96	16.15
Strongly agree		1.67	3.57	1.23	0.86	1.01	1.92
No opinion		2.78	3.57	1.84	1.72	1.27	0.38
Perceived responsibility							
Myself and household	1.99	4.25 (0.73)	3.88 (0.96)	4.21 (0.76)	4.18 (0.91)	4.17 (0.85)	4.18 (0.75)
Strongly disagree		0.54	3.51	1.21	2.50	1.72	0.75
Disagree		1.08	7.02	1.82	2.50	2.22	1.49
Neutral		5.95	8.77	5.45	7.50	7.88	10.45
Agree		62.16	61.40	59.39	25.50	57.14	54.48
Strongly agree		25.41	17.54	30.30	31.67	27.83	31.72
No opinion		4.86	1.75	1.82	3.33	3.20	1.12
Local fire department	0.26	4.13 (0.94)	4.12 (0.78)	4.08 (0.96)	4.13 (0.98)	4.05 (0.96)	4.11 (0.84)
Strongly disagree		1.09	0.00	1.82	1.68	1.74	0.75
Disagree		6.56	5.26	6.67	7.56	7.44	4.49
Neutral		8.20	8.77	7.27	7.56	7.94	11.25
Agree		50.82	54.39	53.33	44.54	52.36	51.59
Strongly agree		29.51	31.58	27.27	36.97	27.79	30.34
No opinion		3.83	0.00	3.64	1.68	2.73	1.50

Note: The *F* statistic is computed from a one-way analysis of variance

*** $p < 0.0001$

Table 19 continued. *Means and Proportions for Psychological and Social Characteristics, by Community*

	ANOVA	Low Community Level Wildfire Management			Moderate to High Community Level Wildfire Management		
	F-value	Edson *(n = 186)*	High Level *(n = 57)*	Peace River *(n = 168)*	Grande Cache *(n= 120)*	Hinton *(n = 410)*	Whitecourt *(n = 268)*
Perceived responsibility							
Municpal government	1.68	4.31 (0.86)	4.09 (0.71)	4.25 (0.82)	4.40 (0.87)	4.26 (0.82)	4.19 (0.83)
Strongly disagree		0.55	0.00	0.61	1.67	1.49	0.37
Disagree		3.83	3.51	3.64	2.50	2.97	4.12
Neutral		5.46	10.53	6.67	5.83	6.19	9.74
Agree		49.73	59.65	51.52	36.67	49.50	50.56
Strongly agree		34.97	26.32	34.55	50.83	36.88	32.58
No opinion		5.46	0.00	3.03	2.50	2.97	2.62
Provincial government	1.70	4.29 (0.96)	4.26 (0.64)	4.22 (0.86)	4.41 (0.82)	4.25 (0.86)	4.14 (0.93)
Strongly disagree		1.62	0.00	0.61	0.83	4.74	1.12
Disagree		4.32	1.75	4.24	2.50	3.47	5.22
Neutral		6.49	5.26	8.48	6.67	7.69	11.57
Agree		44.32	57.89	48.48	37.50	45.16	45.90
Strongly agree		37.30	35.09	35.15	50.00	39.45	33.21
No opinion		5.95	0.00	3.03	2.50	2.48	2.99
Federal government	1.37	3.99 (1.14)	3.84 (1.07)	3.90 (1.11)	4.20 (1.04)	3.99 (1.11)	3.94 (1.04)
Strongly disagree		3.31	3.51	3.68	2.56	2.98	2.63
Disagree		8.84	12.28	9.82	5.13	8.44	6.02
Neutral		12.71	7.02	11.66	11.11	13.65	19.55
Agree		41.44	50.88	45.40	35.90	39.95	42.11
Strongly agree		27.62	26.32	26.38	41.88	31.51	25.94
No opinion		6.08	0.00	3.07	3.42	3.47	3.76

Note: The *F* statistic is computed from a one-way analysis of variance

*** $p < 0.0001$

Table 19 continued. *Means and Proportions for Psychological and Social Characteristics, by Community*

		Low Community Level Wildfire Management			Moderate to High Community Level Wildfire Management		
	ANOVA	Edson	High Level	Peace River	Grande Cache	Hinton	Whitecourt
	F-value	*(n = 186)*	*(n = 57)*	*(n = 168)*	*(n= 120)*	*(n = 410)*	*(n = 268)*
Sense of Community							
Often interact with others	1.34	3.91 (0.99)	4.02 (0.80)	4.02 (0.83)	4.00 (0.83)	4.01 (0.86)	3.86 (0.88)
Strongly disagree		1.12	0.00	0.00	0.85	0.74	1.15
Disagree		9.50	3.64	4.82	5.08	4.47	5.34
Neutral		14.53	18.18	16.27	12.71	16.87	23.28
Agree		50.84	52.73	53.01	56.78	50.87	47.71
Strongly agree		20.11	23.64	23.49	23.73	25.06	21.76
No opinion		3.91	1.82	2.41	0.85	1.99	0.76
Feel like I belong in this town	1.50	3.97 (0.99)	4.09 (0.82)	4.11 (0.78)	4.15 (0.81)	4.09 (0.86)	3.97 (0.86)
Strongly disagree		2.21	0.00	0.60	0.00	1.49	1.13
Disagree		5.52	3.64	1.81	3.36	2.72	3.77
Neutral		16.57	16.36	14.46	15.13	14.11	19.25
Agree		48.62	49.09	54.22	45.38	50.25	50.57
Strongly agree		23.20	29.09	27.11	35.19	29.95	23.77
No opinion		3.87	1.82	1.81	0.84	1.49	1.51
I would not move away	6.87***	3.02 (1.32)bc	2.95 (1.08)b	3.27 (1.11)ab	3.64 (1.23)a	3.31 (1.21)ac	2.99 (1.18)b
Strongly disagree		13.41	3.64	3.64	4.17	5.69	8.46
Disagree		24.02	38.18	23.64	15.83	22.77	27.31
Neutral		27.93	29.09	29.70	24.17	25.99	35.37
Agree		18.99	18.18	30.30	25.83	27.97	16.92
Strongly agree		12.85	10.90	10.91	27.50	15.10	9.23
No opinion		2.79	0.00	1.82	2.50	2.48	2.69

Note: The *F* statistic is computed from a one-way analysis of variance

*** $p < 0.0001$

Table 20: *Means and Proportions for Psychological and Social Characteristics, by Community Wildfire Management Level*

	t-value	**Low Community Level Wildfire Management** *(n = 411)*	**Moderate to High Community Level Wildfire Management** *(n= 798)*
Outcome Expectancy			
Preparing for wildfires will reduce damage to my house	-0.54	3.73 (1.12)	3.77 (1.11)
Strongly disagree		1.99	1.93
Disagree		14.14	7.39
Neutral		18.36	13.36
Agree		45.66	27.23
Strongly agree		13.65	13.61
No opinion		6.2	2.61
Too destructive to bother preparing	0.15	2.19 (1.20)	2.18 (1.23)
Strongly disagree		26.980	28.720
Disagree		48.510	47.140
Neutral		13.370	13.090
Agree		5.200	4.320
Strongly agree		1.240	1.780
No opinion		4.700	4.960
Self-efficacy			
Considerable control over life	1.39	4.21 (0.85)	4.14 (0.81)
Strongly disagree		1.51	0.64
Disagree		3.27	4.36
Neutral		7.56	8.97
Agree		50.13	53.59
Strongly agree		35.77	31.67
No opinion		1.76	0.77
Solve most of my problems myself	-0.54	4.05 (0.87)	4.08 (0.78)
Strongly disagree		0.75	0.9
Disagree		6.47	4.35
Neutral		8.96	7.42
Agree		57.21	61.51
Strongly agree		24.13	25.19
No opinion		2.49	0.64
Problem-focused coping			
Come up with a strategy	0.78	4.26 (0.64)	4.23 (0.58)
Strongly disagree		0.50	0.13
Disagree		0.25	0.26
Neutral		3.75	4.10
Agree		60.00	62.95
Strongly agree		33.75	31.79
No opinion		1.75	0.77

Table 20 continued. *Means and Proportions for Psychological and Social Characteristics, by Community Wildfire Management Level*

	t-value	**Low Community Level Wildfire Management** *(n = 411)*	**Moderate to High Community Level Wildfire Management** *(n= 798)*
Problem-focused coping			
Think about how best to handle problem	0.86	4.32 (0.63)	4.28 (0.58)
Strongly disagree		0.50	0.13
Disagree		0.50	0.26
Neutral		4.01	5.66
Agree		64.16	64.86
Strongly agree		28.82	28.19
No opinion		2.01	0.90
Sometimes feel helpless	0.37	2.44 (1.13)	2.42 (1.06)
Strongly disagree		16.29	16.99
Disagree		48.37	46.69
Neutral		16.79	17.12
Agree		14.29	16.86
Strongly agree		1.75	1.3
No opinion		2.51	1.04
Perceived responsibility			
Myself and household	1.09	4.18 (0.79)	4.18 (0.82)
Strongly disagree		1.23	1.51
Disagree		2.21	2.02
Neutral		6.14	8.69
Agree		60.93	55.54
Strongly agree		26.29	29.72
No opinion		3.19	2.52
Local fire department	1.00	4.11 (0.92)	4.08 (0.92)
Strongly disagree		1.23	1.39
Disagree		6.42	6.46
Neutral		7.9	9
Agree		52.35	50.95
Strongly agree		28.89	30.04
No opinion		3.21	2.15
Municpal government	1.07	4.25 (0.82)	4.26 (0.85)
Strongly disagree		0.49	1.14
Disagree		3.7	3.29
Neutral		6.67	7.33
Agree		51.85	47.91
Strongly agree		33.58	37.55
No opinion		3.7	2.78

Table 20 continued. *Means and Proportions for Psychological and Social Characteristics, by Community Wildfire Management Level*

	t-value	**Low Community Level Wildfire Management** *(n = 411)*	**Moderate to High Community Level Wildfire Management** *(n= 798)*
Perceived responsibility			
Provincial government	1.06	4.26 (0.88)	4.23 (0.90)
Strongly disagree		0.98	1.39
Disagree		3.93	3.92
Neutral		7.13	8.85
Agree		47.91	44.25
Strongly agree		36.12	38.94
No opinion		3.93	2.65
Federal government	1.09	3.94 (1.12)	4.00 (1.07)
Strongly disagree		3.49	2.8
Disagree		9.73	7.12
Neutral		11.47	15.27
Agree		44.39	40.08
Strongly agree		26.93	31.17
No opinion		3.99	3.56
Sense of Community			
Often interact with others	0.27	3.97 (0.90)	3.96 (0.87)
Strongly disagree		0.50	0.89
Disagree		6.75	4.85
Neutral		15.75	18.39
Agree		52.00	50.70
Strongly agree		22.00	23.75
No opinion		3.00	1.40
Feel like I belong in this town	-0.28	4.04 (0.89)	4.06 (0.85)
Strongly disagree		1.24	1.14
Disagree		3.73	3.18
Neutral		15.67	15.99
Agree		51.00	49.62
Strongly agree		25.62	28.68
No opinion		2.74	1.40
I would not move away	-1.94	3.11 (1.21)	3.25 (1.22)
Strongly disagree		8.02	6.38
Disagree		25.81	23.21
Neutral		28.82	28.83
Agree		23.56	23.98
Strongly agree		11.78	15.05
No opinion		2.01	2.55

Table 21. *Means and Proportions for Response Efficacy Indicators, by Community*

		Low Community Level Wildfire Management			Moderate to High Community Level Wildfire Management		
	ANOVA *F-value*	Edson *(n = 186)*	High Level *(n = 57)*	Peace River *(n = 168)*	Grande Cache *(n= 120)*	Hinton *(n = 410)*	Whitecourt *(n = 268)*
Response Efficacy							
Information	0.92	3.43 (1.49)	3.14 (1.46)	3.23 (1.23)	3.23 (1.37)	3.29 (1.36)	3.33 (1.37)
Strongly disagree		9.55	12.50	6.92	10.26	8.02	7.58
Disagree		18.54	23.21	23.90	20.51	26.07	22.35
Neutral		26.97	26.79	25.16	29.91	28.32	26.52
Agree		24.72	25.00	33.33	23.08	23.56	28.41
Strongly agree		5.06	0.00	5.03	7.69	3.76	3.79
No opinion		15.17	12.50	5.66	8.55	10.28	11.36
Social norms	1.01	3.93 (1.29)	3.58 (1.29)	3.77 (1.25)	3.80 (1.23)	3.71 (1.21)	3.77 (1.33)
Strongly disagree		1.66	3.51	2.45	1.71	2.23	3.75
Disagree		9.39	14.04	7.36	7.69	6.70	7.49
Neutral		28.18	35.09	38.65	36.75	43.18	38.95
Agree		35.91	29.82	30.06	32.48	27.79	25.47
Strongly agree		4.97	3.51	5.52	5.13	5.46	6.37
No opinion		19.89	14.04	15.95	16.24	14.64	17.98
Cost	1.08	3.71 (1.32)	3.68 (1.35)	3.67 (1.24)	3.86 (1.28)	3.60 (1.24)	3.58 (1.28)
Strongly disagree		3.30	8.77	3.07	2.54	3.99	4.17
Disagree		20.33	10.53	17.18	5.25	17.96	18.56
Neutral		14.29	21.05	19.63	17.80	21.20	22.73
Agree		35.16	28.07	37.42	32.20	34.16	32.58
Strongly agree		17.58	26.32	14.72	22.03	16.46	13.64
No opinion		9.34	5.26	7.98	10.17	6.23	8.33

Note: The *F* statistic is computed from a one-way analysis of variance

** $p < 0.001$

Table 21 continued. *Means and Proportions for Response Efficacy Indicators, by Community*

	ANOVA	Low Community Level Wildfire Management			Moderate to High Community Level Wildfire Management		
	F-value	Edson *(n = 186)*	High Level *(n = 57)*	Peace River *(n = 168)*	Grande Cache *(n= 120)*	Hinton *(n = 410)*	Whitecourt *(n = 268)*
Response Efficacy							
Time priority	0.81	3.26 (1.24)	2.98 (0.99)	3.09 (1.12)	3.24 (1.12)	3.18 (1.18)	3.13 (1.13)
Strongly disagree		4.97	1.82	4.38	2.52	4.25	4.14
Disagree		21.55	32.73	23.13	24.37	24.5	22.93
Neutral		37.57	40.00	47.50	36.13	37.75	45.11
Agree		23.20	18.18	15.63	26.05	23.00	17.67
Strongly agree		3.87	5.45	3.13	5.88	3.25	3.76
No opinion		8.84	1.82	6.25	5.04	7.25	6.39
Physical issues	1.98	2.70 (1.65)	2.60 (1.66)	2.73 (1.60)	3.12 (1.62)	2.73 (1.55)	2.58 (1.59)
Strongly disagree		26.82	33.33	26.71	20.83	23.44	29.96
Disagree		33.52	29.82	29.81	22.50	32.92	31.09
Neutral		10.61	5.26	12.42	11.67	14.21	13.48
Agree		13.41	15.79	14.91	23.33	15.21	12.36
Strongly agree		3.35	7.02	6.83	12.50	4.74	2.62
No opinion		12.29	8.77	9.32	9.17	9.48	10.49
Skills	0.72	3.02 (1.53)	2.65 (1.38)	2.98 (1.50)	3.00 (1.51)	2.96 (1.47)	2.87 (1.44)
Strongly disagree		15.93	22.81	16.05	18.33	16.71	19.17
Disagree		31.87	31.58	33.95	27.50	30.17	29.32
Neutral		12.64	17.54	10.49	13.33	14.96	13.53
Agree		24.18	17.54	22.84	24.17	24.19	26.69
Strongly agree		4.95	7.02	9.26	10.00	6.23	5.26
No opinion		10.44	3.51	7.41	6.67	7.73	6.02

Note: The *F* statistic is computed from a one-way analysis of variance

** $p < 0.001$

Table 21 continued. *Means and Proportions for Response Efficacy Indicators, by Community*

	ANOVA	Low Community Level Wildfire Management			Moderate to High Community Level Wildfire Management		
	F-value	Edson *(n = 186)*	High Level *(n = 57)*	Peace River *(n = 168)*	Grande Cache *(n= 120)*	Hinton *(n = 410)*	Whitecourt *(n = 268)*
Response Efficacy							
Connection to Nature	0.55	2.55 (1.54)	2.33 (1.38)	2.51 (1.51)	2.69 (1.65)	2.50 (1.49)	2.48 (1.47)
Strongly disagree		22.22	24.56	24.84	24.17	25.56	21.59
Disagree		46.11	47.37	40.99	36.67	39.10	47.35
Neutral		11.67	17.54	16.77	15.83	17.79	16.29
Agree		6.67	0.00	3.73	7.50	5.76	2.27
Strongly agree		1.11	1.75	3.11	0.83	1.25	1.14
No opinion		12.22	8.77	10.56	15.00	10.53	11.36
Threat not significant	4.48**	3.38 (1.34)a	3.47 (1.21)a	3.34 (1.22)a	2.80 (1.39)b	3.16 (1.33)ab	3.07 (1.21)ab
Strongly disagree		8.24	8.77	8.54	22.69	12.94	7.89
Disagree		21.98	14.04	18.29	25.21	22.39	30.08
Neutral		17.03	17.54	18.90	12.61	16.42	21.80
Agree		35.16	40.35	42.07	32.77	36.07	30.08
Strongly agree		10.99	19.30	9.15	2.52	7.96	7.52
No opinion		6.59	0.00	3.05	4.20	4.23	2.63

Note: The *F* statistic is computed from a one-way analysis of variance

** $p < 0.001$

Table 22. *Means and Proportions for Response Efficacy Indicators, by Community Wildfire Management Level*

	t-value	**Low Community Level Wildfire Management** *(n = 411)*	**Moderate to High Community Level Wildfire Management** *(n= 798)*
Response Efficacy			
Information	0.70	3.31 (1.39)	3.25 (1.27)
Strongly disagree		8.91	8.21
Disagree		21.37	23.97
Neutral		26.21	27.95
Agree		28.24	25.13
Strongly agree		4.33	4.36
No opinion		10.94	10.38
Social norms	0.85	3.81 (1.27)	3.75 (1.25)
Strongly disagree		2.24	2.67
Disagree		9.23	7.12
Neutral		33.42	40.79
Agree		32.67	27.70
Strongly agree		4.99	5.72
No opinion		17.46	16.01
Cost	0.79	3.69 (1.29)	3.63 (1.26)
Strongly disagree		3.98	3.83
Disagree		17.66	17.75
Neutral		17.41	21.20
Agree		35.07	33.33
Strongly agree		17.66	16.35
No opinion		8.21	7.54
Time priority	-0.30	3.15 (1.16)	3.17 (1.16)
Strongly disagree		4.29	3.95
Disagree		23.74	23.95
Neutral		41.92	40
Agree		19.44	21.66
Strongly agree		3.79	3.82
No opinion		6.82	6.62
Physical issues	-0.43	2.70 (1.62)	2.74 (1.58)
Strongly disagree		27.71	25.25
Disagree		31.49	30.70
Neutral		10.58	13.58
Agree		14.36	15.48
Strongly agree		5.29	5.20
No opinion		10.58	9.77
Skills	0.40	2.95 (1.50)	2.94 (1.46)
Strongly disagree		16.96	17.79
Disagree		32.67	29.48
Neutral		12.47	14.23
Agree		22.69	25.03
Strongly agree		6.98	6.48
No opinion		8.23	6.99

* $p < 0.05$

Table 22 continued. *Means and Proportions for Response Efficacy Indicators, by Community Wildfire Management Level*

	t-value	**Low Community Level Wildfire Management** *(n = 411)*	**Moderate to High Community Level Wildfire Management** *(n= 798)*
Response Efficacy			
Connection to Nature	-0.20	2.50 (1.51)	2.52 (1.51)
Strongly disagree		23.62	24.01
Disagree		44.22	41.51
Neutral		14.57	16.99
Agree		4.52	4.85
Strongly agree		2.01	1.15
No opinion		11.06	11.49
Threat not significant	3.81*	3.38 (1.27)	3.08 (1.31)
Strongly disagree		8.44	12.71
Disagree		19.35	25.41
Neutral		17.87	17.66
Agree		38.71	33.55
Strongly agree		11.41	6.99
No opinion		4.22	3.68

* $p < 0.05$

Table 23. *Means and Proportions for Confidence in Firefighters, by Community*

		Low Community Level Wildfire Management			Moderate to High Community Level Wildfire Management		
	ANOVA	Edson	High Level	Peace River	Grande Cache	Hinton	Whitecourt
	F-value	*(n = 186)*	*(n = 57)*	*(n = 168)*	*(n= 120)*	*(n = 410)*	*(n = 268)*
Likelihood firefighters could protect home	3.50*	3.67 (1.25)a	3.42 (1.21)ab	3.51 (1.22)ab	3.14 (1.23)b	3.61 (1.15)a	3.57 (1.14)a
Very unlikely		6.56	8.77	6.02	12.71	4.15	3.37
Unlikely		13.66	14.04	18.67	16.1	15.12	17.98
Not sure		18.03	22.81	19.28	29.66	22.20	20.97
Likely		31.69	35.09	30.72	27.12	33.9	33.71
Very likely		28.42	19.30	25.30	14.41	23.66	23.60
No opinion		1.64	0.00	0.00	0.00	0.98	0.37

Note: The *F* statistic is computed from a one-way analysis of variance

* $p < 0.05$

Table 24. *Means and Proportions for Confidence in Firefighters, by Community Wildfire Management Level*

		Low Community Level Wildfire Management	Moderate to High Community Level Wildfire Management
	t-value	*(n = 406)*	*(n= 795)*
Likelihood firefighters could protect home	0.54	3.57 (1.16)	3.53 (1.11)
Very unlikely		6.65	5.16
Unlikely		15.76	16.23
Not sure		19.21	22.89
Likely		31.77	32.83
Very likely		25.86	22.26
No opinion		0.74	0.63

Table 25. *Preferences for Wildfire Risk Reduction Measures, by Community*

		Low Community Level Wildfire Management			Moderate to High Community Level Wildfire Management		
	ANOVA *F-value*	Edson *(n = 186)*	High Level *(n = 57)*	Peace River *(n = 168)*	Grande Cache *(n= 120)*	Hinton *(n = 410)*	Whitecourt *(n = 268)*
Educate homeowners about ways to reduce wildfire risk on their properties	0.78	4.51 (0.79)	4.33 (0.86)	4.53 (0.65)	4.51 (0.72)	4.51 (0.66)	4.49 (0.68)
Strongly oppose		0.54	1.82	0.00	0.00	0.00	0.00
Somewhat oppose		0.54	1.82	0.00	0.83	0.99	0.00
Neutral		8.06	7.27	7.19	9.17	5.21	8.37
Somewhat favour		34.95	41.82	33.53	30.00	36.97	36.88
Strongly favour		50.54	45.45	58.08	58.33	55.58	52.47
No opinion		5.38	1.82	1.20	1.67	1.24	2.28
Bylaws requiring homeowners to remove shrubs, trees and dead branches close to their house	0.62	3.73 (1.32)	3.44 (1.29)	3.62 (1.28)	3.73 (1.35)	3.62 (1.19)	3.66 (1.22)
Strongly oppose		5.91	12.73	6.02	9.17	4.69	5.30
Somewhat oppose		15.05	7.27	16.87	12.50	15.56	14.39
Neutral		18.28	27.27	18.67	14.17	20.99	21.21
Somewhat favour		26.34	29.09	28.31	25.83	31.11	29.17
Strongly favour		29.57	23.64	27.71	37.5	26.91	28.41
No opinion		4.84	0.00	2.41	0.83	0.74	1.52
Reduced insurance premiums if recommended ativities are done	0.11	4.38 (0.97)	4.33 (0.84)	4.40 (0.90)	4.38 (0.96)	4.35 (0.92)	4.36 (0.87)
Strongly oppose		2.20	1.82	1.20	2.50	1.99	0.76
Somewhat oppose		1.65	0.00	3.61	1.67	2.24	2.65
Neutral		12.64	10.91	8.43	12.50	10.95	12.50
Somewhat favour		26.92	40.00	29.52	24.17	30.60	29.55
Strongly favour		52.75	45.45	55.42	57.50	52.49	53.03
No opinion		3.85	1.82	1.81	1.67	1.74	1.52

Note: The *F* statistic is computed from a one-way analysis of variance

Table 25 continued. *Preferences for Wildfire Risk Reduction Measures, by Community*

	ANOVA *F-value*	Low Community Level Wildfire Management			Moderate to High Community Level Wildfire Management		
		Edson *(n = 186)*	High Level *(n = 57)*	Peace River *(n = 168)*	Grande Cache *(n = 120)*	Hinton *(n = 410)*	Whitecourt *(n = 268)*
Neighbourhood work bees to help people to prepare homes and properties for wildfires	1.81	3.52 (1.16)	3.40 (1.05)	3.74 (0.99)	3.68 (1.20)	3.64 (1.07)	3.50 (1.03)
Strongly oppose		3.24	7.27	0.61	5.83	1.74	3.04
Somewhat oppose		12.97	9.09	7.27	7.50	10.42	9.89
Neutral		37.84	30.91	35.15	30.00	35.73	39.16
Somewhat favour		27.03	41.82	36.36	30.00	31.27	32.32
Strongly favour		12.43	10.91	15.76	22.50	16.13	12.93
No opinion		6.49	0.00	4.85	4.17	4.71	2.66
Free wildfire hazard assessments for residential properties	1.99	4.23 (1.02)	4.02 (0.89)	4.41 (0.79)	4.34 (0.91)	4.29 (0.83)	4.25 (0.83)
Strongly oppose		1.09	1.82	0.61	0.84	0.25	0.38
Somewhat oppose		4.92	5.45	0.61	2.52	2.25	1.14
Neutral		15.85	10.91	9.15	14.29	14.50	17.05
Somewhat favour		31.69	52.73	40.85	30.25	36.25	37.50
Strongly favour		40.98	29.09	44.51	48.74	45.00	42.05
No opinion		5.46	0.00	4.27	3.36	1.75	1.89
Bylaws requiring new houses to use fire retardant building materials	0.85	4.11 (1.15)	3.96 (1.05)	4.25 (1.04)	4.20 (1.15)	4.17 (1.06)	4.11 (1.09)
Strongly oppose		4.89	3.64	2.41	4.20	1.98	4.53
Somewhat oppose		4.89	7.27	6.02	6.72	8.64	3.77
Neutral		13.59	10.91	9.04	10.08	10.37	15.09
Somewhat favour		30.98	47.27	31.93	24.37	29.38	30.94
Strongly favour		42.39	29.09	47.59	52.94	48.40	44.53
No opinion		3.26	1.82	3.01	1.68	1.23	1.13

Note: The *F* statistic is computed from a one-way analysis of variance

Table 25 continued. *Preferences for Wildfire Risk Reduction Measures, by Community*

	ANOVA	Low Community Level Wildfire Management			Moderate to High Community Level Wildfire Management		
		Edson	High Level	Peace River	Grande Cache	Hinton	Whitecourt
	F-value	*(n = 186)*	*(n = 57)*	*(n = 168)*	*(n= 120)*	*(n = 410)*	*(n = 268)*
Restrict houses from being built in high risk areas	1.68	3.70 (1.36)	3.60 (1.30)	3.92 (1.28)	3.68 (1.36)	3.61 (1.32)	3.58 (1.33)
Strongly oppose		4.89	9.09	5.42	5.88	7.43	8.33
Somewhat oppose		20.11	12.73	12.05	18.49	15.59	14.77
Neutral		16.30	16.36	12.65	17.65	20.79	21.59
Somewhat favour		22.28	34.55	28.92	21.85	23.27	24.24
Strongly favour		31.52	25.45	36.75	31.93	30.69	28.41
No opinion		4.89	1.82	4.22	4.20	2.23	2.65

Note: The *F* statistic is computed from a one-way analysis of variance

Table 26. *Preferences for Wildfire Risk Reduction Measures, by Community Wildfire Management Levels*

	t-value	**Low Community Level Wildfire Management** *(n = 411)*	**Moderate to High Community Level Wildfire Management** *(n= 798)*
Educate homeowners about ways to reduce wildfire risk on their properties	-0.20	4.49 (0.75)	4.50 (0.68)
Strongly oppose		0.49	0.00
Somewhat oppose		0.49	0.64
Neutral		7.60	6.87
Somewhat favour		35.29	35.88
Strongly favour		52.94	54.96
No opinion		3.19	1.65
Bylaws requiring homeowners to remove shrubs, trees and dead branches close to their house	-0.04	3.65 (1.30)	3.65 (1.22)
Strongly oppose		6.88	5.58
Somewhat oppose		14.74	14.70
Neutral		19.66	20.03
Somewhat favour		27.52	29.66
Strongly favour		28.01	29.02
No opinion		3.19	1.01
Reduced insurance premiums if recommended activities are done	0.44	4.38 (0.92)	4.35 (0.91)
Strongly oppose		1.74	1.65
Somewhat oppose		2.23	2.29
Neutral		10.67	11.70
Somewhat favour		29.78	29.26
Strongly favour		52.85	53.44
No opinion		2.73	1.65
Neighbourhood work bees to help people to prepare homes and properties for wildfires	-0.10	3.59 (1.09)	3.60 (1.08)
Strongly oppose		2.72	2.80
Somewhat oppose		10.12	9.80
Neutral		35.80	36.01
Somewhat favour		32.84	31.42
Strongly favour		13.58	16.03
No opinion		4.94	3.94
Free wildfire hazard assessments for residential properties	-0.10	4.27 (0.92)	4.28 (0.84)
Strongly oppose		1.00	0.38
Somewhat oppose		3.23	1.92
Neutral		12.44	15.33
Somewhat favour		38.31	35.76
Strongly favour		40.8	44.57
No opinion		4.23	2.04

* $p < 0.05$

Table 26 continued. *Preferences for Wildfire Risk Reduction Measures, by Community Wildfire Management Levels*

	t-value	**Low Community Level Wildfire Management** *(n = 411)*	**Moderate to High Community Level Wildfire Management** *(n= 798)*
Bylaws requiring new houses to use fire retardant building materials	-0.10	4.15 (1.10)	4.15 (1.09)
Strongly oppose		3.70	3.17
Somewhat oppose		5.68	6.72
Neutral		11.36	11.91
Somewhat favour		33.58	29.15
Strongly favour		42.72	47.78
No opinion		2.96	1.27
Restrict houses from being built in high risk areas	2.09*	3.78 (1.32)	3.61 (1.33)
Strongly oppose		5.68	7.50
Somewhat oppose		15.80	15.76
Neutral		14.81	20.58
Somewhat favour		26.67	23.38
Strongly favour		32.84	30.11
No opinion		4.20	2.67

* $p < 0.05$

Table 27. *Preferences for Wildfire Suppression and Management and Perceived Effectiveness, by Community*

	ANOVA	Low Community Level Wildfire Management			Moderate to High Community Level Wildfire Management		
	F-value	Edson *(n = 186)*	High Level *(n = 57)*	Peace River *(n = 168)*	Grande Cache *(n= 120)*	Hinton *(n = 410)*	Whitecourt *(n = 268)*
Wildfire suppression							
Let burn unless human safety and public and private structures are not in danger	4.82**	3.16 (1.48)ab	3.04 (1.49)abc	3.16 (1.47)ab	3.43 (1.38)a	2.98 (1.34)bc	2.74 (1.38)c
Strongly oppose		16.30	21.43	15.06	12.61	17.12	22.35
Somewhat oppose		23.91	17.86	28.92	19.33	26.05	30.68
Neutral		12.50	16.07	5.42	3.36	10.67	9.47
Somewhat favour		26.63	30.36	29.52	44.54	35.24	27.27
Strongly favour		16.30	8.93	18.07	17.65	9.68	8.33
No opinion		4.35	5.36	3.01	2.52	1.24	1.89
Fight if the fire is likely to be very intense and spread very quickly	1.36	2.98 (1.53)	3.09 (1.50)	2.96 (1.56)	3.36 (1.55)	3.11 (1.47)	2.99 (1.53)
Strongly oppose		23.37	23.21	22.89	18.64	18.56	20.83
Somewhat oppose		20.65	14.29	26.51	15.25	23.51	26.89
Neutral		11.96	12.50	6.02	10.17	9.41	8.71
Somewhat favour		26.63	33.93	24.10	25.42	26.73	22.35
Strongly favour		13.04	12.50	16.87	27.97	20.79	18.18
No opinion		4.35	3.57	3.61	2.54	0.99	3.03
Fight if the fire is likely to burn large areas of land	0.93	2.84 (1.53)	3.20 (1.48)	2.74 (1.43)	2.94 (1.57)	2.86 (1.43)	2.83 (1.45)
Strongly oppose		25.54	17.86	23.35	22.88	22.08	22.73
Somewhat oppose		22.28	19.64	29.94	24.58	26.30	26.52
Neutral		16.30	10.71	10.78	13.56	11.66	14.77
Somewhat favour		19.57	32.14	25.15	20.34	25.56	19.70
Strongly favour		10.87	16.07	7.19	11.86	12.66	14.02
No opinion		5.43	3.57	3.59	6.78	1.74	2.27

Note: The *F* statistic is computed from a one-way analysis of variance

*** $p < 0.0001$, ** $p < 0.001$, * $p < 0.05$

Table 27 continued. *Preferences for Wildfire Suppression and Management and Perceived Effectiveness, by Community*

	ANOVA *F-value*	Low Community Level Wildfire Management: Edson *(n = 186)*	High Level *(n = 57)*	Peace River *(n = 168)*	Moderate to High Community Level Wildfire Management: Grande Cache *(n= 120)*	Hinton *(n = 410)*	Whitecourt *(n = 268)*
Wildfire suppression							
Wildfires should be fought as soon as they start, no matter the cost	3.32*	3.28 (1.53)ab	3.21 (1.52)ab	2.99 (1.56)b	2.97 (1.54)b	3.15 (1.43)ab	3.48 (1.41)a
Strongly oppose		15.22	12.50	19.88	21.19	14.00	8.75
Somewhat oppose		23.37	30.36	29.52	26.27	27.25	21.29
Neutral		13.04	14.29	0.84	14.41	14.50	19.39
Somewhat favour		17.93	12.50	15.06	12.71	19.25	17.49
Strongly favour		27.17	26.79	21.08	23.73	24.00	30.42
No opinion		3.26	3.57	3.61	1.69	1.00	2.66
Preference							
Fireguards	7.38***	4.18 (1.08)ac	4.50 (0.79)bc	4.05 (1.13)ab	4.49 (0.92)c	4.33 (0.94)c	3.98 (1.08)a
Strongly oppose		2.69	0.00	1.20	1.67	1.48	3.79
Somewhat oppose		5.38	1.79	13.86	5.00	5.19	5.68
Neutral		10.75	8.93	7.23	2.50	6.67	16.67
Somewhat favour		40.86	30.36	38.55	25.83	33.83	37.88
Strongly favour		32.80	55.36	34.34	63.33	50.86	34.09
No opinion		7.53	3.57	4.82	1.67	1.98	1.89
Thinning	3.12*	3.99 (1.09)ab	4.11 (1.00)ab	3.77 (1.15)a	4.15 (1.04)b	4.09 (0.98)b	3.91 (1.10)ab
Strongly oppose		1.08	0.00	2.40	2.50	1.72	2.27
Somewhat oppose		10.27	7.14	13.77	6.67	6.65	10.61
Neutral		15.14	16.07	20.36	9.17	11.33	17.42
Somewhat favour		43.24	42.86	34.73	40.00	43.84	35.98
Strongly favour		22.70	26.79	25.15	38.33	34.48	31.44
No opinion		7.57	7.14	3.59	3.33	1.97	2.27

Note: The *F* statistic is computed from a one-way analysis of variance

*** $p < 0.0001$, ** $p < 0.001$, * $p < 0.05$

Table 27 continued. *Preferences for Wildfire Suppression and Management and Perceived Effectiveness, by Community*

	ANOVA	Low Community Level Wildfire Management			Moderate to High Community Level Wildfire Management		
		Edson	High Level	Peace River	Grande Cache	Hinton	Whitecourt
	F-value	*(n = 186)*	*(n = 57)*	*(n = 168)*	*(n= 120)*	*(n = 410)*	*(n = 268)*
Wildfire suppression							
Prescribed burning	6.13***	4.05 (1.02)a	4.30 (1.06)a	4.01 (0.98)a	4.03 (1.14)a	3.69 (1.19)b	3.97 (1.01)a
Strongly oppose		0.54	1.79	2.40	4.20	5.94	2.64
Somewhat oppose		9.73	7.14	6.59	8.40	15.10	6.42
Neutral		11.35	3.57	11.98	10.08	8.66	15.09
Somewhat favour		46.49	42.86	46.71	37.82	46.29	46.04
Strongly favour		26.49	35.71	31.14	36.97	22.52	27.17
No opinion		5.41	8.93	1.20	2.52	1.49	2.64
Effectiveness							
Fireguards	1.74	3.96 (1.05)	4.21 (0.89)	3.85 (1.04)	3.91 (1.02)	3.91 (0.95)	3.82 (0.96)
Very ineffective		2.72	0.00	0.60	1.67	1.98	1.52
Ineffective		4.35	3.57	11.38	10.83	6.67	8.71
Neutral		19.02	14.29	19.76	11.67	15.31	19.32
Effective		50.00	44.64	44.31	49.17	53.09	49.62
Very effective		15.76	32.14	18.56	24.17	20.49	18.56
No opinion		8.15	5.36	5.39	2.50	2.47	2.27
Thinning	6.00***	3.68 (1.17)ac	3.67 (1.26)ab	3.30 (1.15)b	3.75 (1.13)ac	3.79 (0.98)a	3.48 (1.15)b
Very ineffective		0.54	1.82	4.79	4.17	1.23	3.80
Ineffective		16.30	20.00	19.76	9.17	9.63	16.73
Neutral		26.63	18.18	32.93	22.50	20.74	28.14
Effective		36.96	40.00	29.94	40.00	49.88	33.46
Very effective		9.78	9.09	8.38	20.00	14.57	14.45
No opinion		9.78	10.91	4.19	4.17	3.95	3.42

Note: The *F* statistic is computed from a one-way analysis of variance

*** $p < 0.0001$, ** $p < 0.001$, * $p < 0.05$

Table 27 continued. *Preferences for Wildfire Suppression and Management and Perceived Effectiveness, by Community*

	ANOVA	Low Community Level Wildfire Management			Moderate to High Community Level Wildfire Management		
	F-value	Edson *(n = 186)*	High Level *(n = 57)*	Peace River *(n = 168)*	Grande Cache *(n= 120)*	Hinton *(n = 410)*	Whitecourt *(n = 268)*
Effectiveness							
Prescribed burning	4.35**	3.84 (1.05)ab	4.02 (1.08)ab	3.63 (1.02)ab	3.98 (1.05)a	3.59 (1.07)b	3.68 (1.05)ab
Very ineffective		1.09	1.82	2.99	2.50	3.22	2.28
Ineffective		9.24	5.45	10.18	5.83	13.37	9.89
Neutral		23.37	20.00	26.95	18.33	23.76	28.52
Effective		43.48	43.64	42.51	42.50	42.33	39.92
Very effective		16.30	20.00	15.57	25.83	15.10	15.59
No opinion		6.52	9.09	1.80	5.00	2.23	3.80

Note: The *F* statistic is computed from a one-way analysis of variance

*** $p < 0.0001$, ** $p < 0.001$, * $p < 0.05$

Table 28. *Preferences for Wildfire Suppression and Management and Perceived Effectiveness, by Community Wildfire Management Level*

	t-value	**Low Community Level Wildfire Management** *(n = 411)*	**Moderate to High Community Level Wildfire Management** *(n= 798)*
Wildfire suppression			
Let burn unless human safety and public and private structures are not in danger	2.00*	3.14 (1.47)	2.97 (1.38)
Strongly oppose		16.5	18.19
Somewhat oppose		25.12	26.59
Neutral		10.1	9.16
Somewhat favour		28.33	33.97
Strongly favour		16.01	10.43
No opinion		3.94	1.65
Fight if the fire is likely to be very intense and spread very quickly	-1.26	2.99 (1.53)	3.11 (1.50)
Strongly oppose		23.15	19.34
Somewhat oppose		22.17	23.41
Neutral		9.61	9.29
Somewhat favour		26.6	25.06
Strongly favour		14.53	20.99
No opinion		3.94	1.91
Fight if the fire is likely to burn large areas	-0.12	2.85 (1.49)	2.86 (1.46)
Strongly oppose		23.59	22.42
Somewhat oppose		25.06	26.11
Neutral		13.27	12.99
Somewhat favour		23.59	22.80
Strongly favour		10.07	12.99
No opinion		4.42	2.68
Wildfires should be fought as soon as they start, no matter the cost	-0.87	3.15 (1.54)	3.23 (1.45)
Strongly oppose		16.75	13.32
Somewhat oppose		26.85	25.10
Neutral		12.32	16.13
Somewhat favour		16.01	17.67
Strongly favour		24.63	26.12
No opinion		3.45	1.66
Preference for Fuel Management Techniques			
Fireguards	-1.07	4.17 (1.07)	4.24 (1.00)
Strongly oppose		1.72	2.28
Somewhat oppose		8.33	5.32
Neutral		9.07	9.38
Somewhat favour		38.48	33.97
Strongly favour		36.52	47.15
No opinion		5.88	1.90

* $p < 0.05$

Table 28 continued. *Preferences for Wildfire Suppression and Management and Perceived Effectiveness, by Community Wildfire Management Level*

	t-value	**Low Community Level Wildfire Management** *(n = 411)*	**Moderate to High Community Level Wildfire Management** *(n= 798)*
Preference for Fuel Management Techniques			
Thinning	-1.84	3.92 (1.11)	4.04 (1.03)
Strongly oppose		1.47	2.03
Somewhat oppose		11.27	7.97
Neutral		17.4	13.04
Somewhat favour		39.71	40.63
Strongly favour		24.26	34.05
No opinion		5.88	2.28
Fireguards	-1.07	4.17 (1.07)	4.24 (1.00)
Strongly oppose		1.72	2.28
Somewhat oppose		8.33	5.32
Neutral		9.07	9.38
Somewhat favour		38.48	33.97
Strongly favour		36.52	47.15
No opinion		5.88	1.90
Thinning	-1.84	3.92 (1.11)	4.04 (1.03)
Strongly oppose		1.47	2.03
Somewhat oppose		11.27	7.97
Neutral		17.4	13.04
Somewhat favour		39.71	40.63
Strongly favour		24.26	34.05
No opinion		5.88	2.28
Prescribed burning	3.54*	4.07 (1.01)	3.83 (1.13)
Strongly oppose		1.47	4.57
Somewhat oppose		8.09	11.17
Neutral		10.54	11.04
Somewhat favour		46.08	44.92
Strongly favour		29.66	26.27
No opinion		4.17	2.03
Effectiveness of Fuel Management Techniques			
Fireguards	1.21	3.94 (1.03)	3.88 (0.96)
Very ineffective		1.47	1.77
Ineffective		7.13	7.98
Neutral		18.67	16.1
Effective		46.93	51.33
Very effective		19.16	20.41
No opinion		6.63	2.41

* $p < 0.05$

Table 28 continued. *Preferences for Wildfire Suppression and Management and Perceived Effectiveness, by Community Wildfire Management Level*

	t-value	**Low Community Level Wildfire Management** *(n = 411)*	**Moderate to High Community Level Wildfire Management** *(n= 798)*
Effectiveness of Fuel Management Techniques			
Thinning	-2.29*	3.52 (1.19)	3.68 (1.07)
Very ineffective		2.46	2.54
Ineffective		18.23	11.93
Neutral		28.08	23.48
Effective		34.48	42.89
Very effective		9.11	15.36
No opinion		7.64	3.81
Prescribed burning	1.49	3.78 (1.05)	3.68 (1.07)
Very ineffective		1.97	2.80
Ineffective		9.11	11.05
Neutral		24.38	24.52
Effective		43.10	41.55
Very effective		16.50	16.90
No opinion		4.93	3.18

* $p < 0.05$